Bull. Pharm. Sci., Assiut University, Vol. 36, Part 1, 2013, pp. 1-9.

Bulletin of Pharmaceutical Sciences
Assiut University

MACROLIDE RESISTANCE OF *STREPTOCOCCUS PNEUMONIAE* IN PATIENTS WITH OTITIS MEDIA

Nabila Rashwan[1], Amany Thabet[1], Noha Afifi[1], Michael Agban[1] and Rehab Mousa[2*]

[1]*Department of Microbiology and Immunology, Faculty of Medicine, Assiut University*
[2]*Al-Azher University Hospital, Azhar University, Assuit, Egypt*

This study was performed on 317 patients attended to pediatric and ENT- Outpatient Clinics at Al- Azhar University Hospital of Assiut during 2 years from 2009-2011, samples were collected from middle ear fluid, 161 patients were males and 156 were females, patients were of different ages ranges from 6 months to 75 years old, children under 10 years represented 53.3% (169) of total patients in this study. The objectives were to determine the macrolide resistance of isolated Strept. pneumoniae. Out of the 317 cases of otitis media, 78 isolates of Strept. pneumoniae were obtained (24.6%). Out of them 66 isolates were from 196 cases of acute otitis media (33.7%) and 12 isolates were from 121 cases of chronic otitis media (9.9%). There were 45 isolates from males, while 33 were from females. Most isolates were taken from patients under 10 years old (51 isolates). Sensitivity pattern of Streptococcus pneumonia showed that 30.7%, 26.9% and 24.4% were resistant to erythromycin, clarithromycin and azithromycin respectively. As previous findings proved that pneumococci resistant to erythromycin have mainly one or both distinct resistance determinants either erm(B) or mef(E). PCR was done to detect these genes in isolates (24) erythromycin resistance, it was observed that 33.3% harbored mef genes, 8.3% erm genes and 41.6% both mef and erm genes. erm B & mef E genes were detected using agarose gel electrophoresis at 224 and 347 bp respectively.

INTRODUCTION

Streptococcus pneumoniae has remained an extremely important human bacterial pathogen. Worldwide, *Strept. Pneumoniae* remains the most common cause of community-acquired pneumonia, bacterial meningitis, bacteremia, sinusitis, septic arthritis, osteomyelitis, peritonitis, endocarditis and otitis media, otitis media often occurs secondary to respiratory infections and is mostly caused by bacterial and viral infections that start in the nasopharynx and rapidly spread through to the Eustachian tube and the middle ear cavity, *Strept. pneumoniae* accounts for 30-40% of lower respiratory tract infections[1&2]. It has been reported that this organism causes more than 1 million deaths annually worldwide especially in children less than 5 years of age, mostly in the developing countries[3]. *Strept. pneumoniae* infections remain a serious problem in both developed and developing countries[4].

The wide spread of antibiotic resistance of *Strept. pneumoniae* maybe due to that they asymptomatically colonize the nasopharynx of up to 60% of healthy children and 30% of health by adults[5]. Children typically acquire a succession of serotypes early in life and are the important source for transmission to vulnerable population[6]. Rates of asymptomatic carriage vary with age, environment and the presence of upper respiratory infections[7]. A range of environmental factors such as day care, season of year, older siblings, parental smoking, housing/crowding and breast feeding influence an individual's level of pathogen exposure and immunity[8].

During the last decade, the clinical management of respiratory infections has become worldwide increasingly complicated by the emergence and spread of resistance in

Received in 2/9/2012 & Accepted in 11/5/2013

*Corresponding author: Rehab Mousa, E-mail: rehabsalah2002@yahoo.com

Strept. pneumoniae to commonly used antibacterial drugs, particularly β-lactams and macrolides, Data from USA showed an overall pneumococcal macrolide (erythromycin) resistance rate of 31.0% in 2000 and 2001[9].

Macrolide resistance in *Strept.. pneumoniae* is mediated by 2 major mechanisms: methylation of ribosomal macrolide target sites, encoded by the *erm*(B) gene and drug efflux, encoded by *mef*(E)[1].

The objective of polymerase chain reaction is being a powerful method for *in-vitro* DNA synthesis. Large amounts of a specific segment of DNA, of defined length and sequence can be synthesized from a small amount of template. PCR is a rapid, sensitive and inexpensive procedure for amplifying DNA of specific interest[10]. The principle of PCR using specific primers is used to detect the *mef E* and *erm* genes in *Strept. pneumoniae* strains. The primers for *mef E* and *erm B* genes are designed. Oligonucleotide pairs are designed to hybridize *erm* B and *mef* E genes from pathogenic species with resistance against erythromycin[11].

This work was planned to estimate the percentage of *Strept. pneumoniae* infection among cases of acute or chronic otitis media, to determine the percentage of *Strept. pneumoniae* resistant to erythromycin and some macrolides from patients attending to pediatric and ENT. Department at Al Azhar university in Assiut, to determine the antibiotic susceptibility profile of erythromycin-resistant *Strept. pneumonia*e and detect the *erm*(B)- and *mef*(E)-mediated erythromycin-resistant *Strept. pneumoniae*.

MATERIAL AND METHODS

This study was conducted on 317 patients of different ages ranging from 6 months to 75 years old. They had otitis media and were presented to peadiatric and ENT departments at Assiut university and Al- Azhar University Hospitals. 161 patients were males and 156 were females, patients were of different age range from 6 months to 75 years old.

Samples were processed at the Laboratory of the department of microbiology and immunology, faculty of medicine, Assiut University.

Sample collection

Middle ear fluid from suspected cases of acute otitis media (AOM) or chronic otitis media (COM) was collected using sterile swabs and containers supplemented with Amies transport media.

Identification of *Strept. pneumoniae*

The otitis media samples were cultured on blood agar, *Strept. pneumoniae* were identified by basic laboratory methods including colony morphology, the α-haemolysis, Gram staining and susceptibility to Optochin (Oxoid, UK).

Antimicrobial susceptibility testing by disc diffusion method according Clinical and Laboratory Standards Institute (CLSI, 2003)

The following antibiotics were used (Oxoid, UK) erythromycin (30 µg), azithromycin (15 µg), clarithromycin (15 µg), ampicillin (30 µg), amoxicillin-clavulanate (30 µg), ceftazidime (30 µg), cefotaxime (30 µg), ceftizoxime (30 µg), cefazolin (25 µg), cefoperazone (75 µg), ciprofloxacin (5 µg), enrofloxacin (5 µg), gentamicin (10 µg), apramycin (15 µg), clindamycin (30 µg), tetracycline (30 µg) and doxycycline (30 µg).

Determination of Minimal inhibitory concentration (MIC) by E-test

Strept. pneumoniae resistant to erythromycin, azithromycin, clarithromycin were further tested by E-tests (bioMérieux, Germany). The results interpreted resistant if MIC range of erythromycin (3-64 µg/ml), for clarithromycin (2-32 µg/ml) and for azithromycin (4-64 µg/ml)

Detection of Erythromycin Resistance Genes

The total DNA was extracted from all isolates using the DNA extraction Kit (QIAamp DNA mini kit, Qiagen, Germany). Polymerase chain reactions were used to amplify two macrolide resistance encoding genes: *erm*(B) and *mef*(E)using specific primers.

Primers (VBC Genomics, Germany): For detection of

- *erm* B gene:
  Forward 5́ CGTACCTGGATATCACCG 3́
  Reverse 5́ GTAACAGTTGACGATATCTCG 3́
- mef E gene.

Forward 5́ AAA ACT GCA GGC GTT TAA GAT AAG CTG GC 3́.
Reverse 5́ CCA ATG CAT CCT GCA CCA TTT GCT CCT AC 3́.

A thermal cycler (Biometra, Germany) was used for amplification with PCR under the following conditions

-initial denaturation step at 95°C for 2 min
-30 cycles consisting of: denaturation at 95°C for 1 min, annealing at 56°C for 2 min, DNAextension at 72°C for 2 min and Final extension at 72°C for 10 min

The amplified DNA fragments were analysed by electrophoresis on 1.5% agarose gels stained with ethidium bromide (0.5 µg /ml) for 30mm. under 100V 1XTAE buffer and visualized by UV trans illuminator (Biometra, Germany) and photographed by Gel Documentation system including BioDocAnalyze (BDA) Software (Biometra, 035-114) for measuring and analyzing the results.

PCR amplicon size were compared with 100-1000 bp molecular weight DNA ladder (Pharmacia Bioron,USA).

RESULTS AND DISCUSSION

Percentage of *Strept. pneumoniae* among cases of acute and chronic otitis media

Out of the 317 cases of otitis media, 78 isolates of *Streptococcus pneumonia* were obtained (24.6%). Sixty six isolates were obtained from 196 cases of acute otitis media (33.7%) and 12 isolates were obtained from 121 cases of chronic otitis media (9.9%)

Relationship of age and sex of patients to incidence of *Streptococcus pneumoniae* in otitis media

Of the total 78 *Strept. pneumoniae* strains isolated in this work, 51 strains (65.4%) were isolated from patients under 10 years old, 20 (25.6%) from patients between over 10-20 years old, 1 (1.3%) from patients between over 20-30 years old, 1 (1.3%) from patients between over 30-40 years old, 3 (3.8%) from patients between over 40-50 years old and 2 (2.6%) from patients over 51 years. Regarding sex, 161 patients (50.8%) were males and 156 patients (49.2%) were females.. Of the total 78 *Strept. pneumoniae* isolates 33 (42.3%) were recovered from males, while 45(57.7%) were from females as in table 1.

Antibiotic sensitivity pattern of *Streptococcus pneumonia*e using disc agar diffusion method

The *in-vitro* sensitivity of 78 *Streptococcus pneumoniae* isolates to different antibiotics is shown in figure 1 and table 2.

Table 1: Incidence of *Streptococcus pneumoniae* according to age and sex of patients of otitis media

Variable \ Cases and number		Total no. of cases (n=317) No. (%)	No. of *Strept. pneumoniae* isolates (n=78) No. (%)
Gender	Males	161 (50.8%)	33 (42.3%)
	Females	156 (49.2%)	45 (57.7%)
	P value	X2 = 1.419	P = 0.234 (N.S)
Age (years)	6 mon -10 y	169 (53.3%)	51 (65.4%)
	Over 10-20 y	98 (30.9%)	20 (25.6%)
	Over 20-30 y	8 (2.5%)	1 (1.3%)
	Over 30-40 y	9 (2.9%)	1 (1.3%)
	Over 40-50 y	12 (3.8%)	3 (3.8%)
	Over 50-75 y	21 (6.6%)	2 (2.6%)
	P value	X2 =5.017	P = 0.414(N.S)

Statistically it is non significant with P≥ 0.05

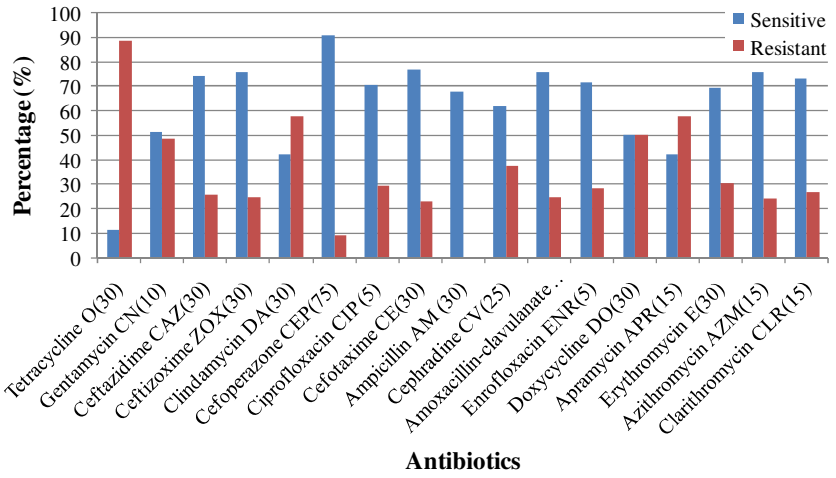

Fig. 1: Frequency distribution of antibiotic sensitivity of *Streptococcus pneumoniae* isolates.

Table 2: The antimicrobial susceptibility pattern of 78 isolates of *Streptococcus pneumoniae* using disc agar diffusion method.

Antibiotic	Sensitive	Resistant	P.value	Sig.
Erythromycin E	54 (69.3%)	24 (30.7%)	0.000	V.H.S
Azithromycin AZM	59 (75.6%)	19 (24.4%)	0.000	V.H.S
Clarithromycin CLR	57 (73.1%)	21 (26.9%)	0.000	V.H.S
Ampicillin AM	53 (67.9%)	25 (32.1%)	0.000	V.H.S
Amoxacillin-clavulanate AUG	59 (75.6%)	19 (24.4%)	0.000	V.H.S
Ceftazidime CAZ	58 (74.4%)	20 (25.6%)	0.000	V.H.S
Cefotaxime CE	60 (76.9%)	18 (23.1%)	0.000	V.H.S
Ceftizoxime ZOX	59 (75.6%)	19 (24.4%)	0.000	V.H.S
Cephradine CV	49 (62.8%)	29 (37.2%)	0.001	V.H.S
Cefoperazone CEP	71 (91.0%)	7 (9.0%)	0.000	V.H.S
Ciprofloxacin CIP	55 (70.5%)	23 (29.5%)	0.000	V.H.S
Enrofloxacin ENR	56 (71.8%)	22 (28.2%)	0.000	V.H.S
Tetracycline O	9 (11.5%)	69 (88.5%)	0.000	V.H.S
Doxycycline DO	39 (50.0%)	39 (50.0%)	0.500	N.S
Gentamycin CN	40 (51.3%)	38 (48.7%)	0.410	N.S
Clindamycin DA	33 (42.3%)	45 (57.7%)	0.084	N.S
Apramycin APR	33 (42.3%)	45 (57.7%)	0.084	N.S

Z. test= Hypothesis test for two proportions from one group.
P> 0.05= non-significant (N.S), P< 0.01= highly significant (H.S).

E-test method for determination of MIC of macrolides for preliminary erythromycin resistant *Streptococcus pneumoniae* (Table 3)

PCR for detection of resistant determinants genes (*mef* E and *erm* B) in erythromycin-resistant *Strept. pneumoniae* (n= 24)

Results of PCR showed that *erm B* & *mef E* genes were detected at 224 and 347 bp respectively as in figure 2. Ten cases (41.6%) showed both *erm B* & *mef E* genes, while 8 cases (33.3%) showed *mef* gene only and 2 cases (8.3%) showed *erm* gene only as in table 4.

Table 5 showed that both *erm* and *mef* genes were detected in strains with MICs of ≥ 24 µg/ml to ≥ 64 µg/ml.

Table 3: Estimation of MIC (µg/ml) of erythromycin, clarithromycin and azithromycin for preliminary macrolide resistant *Streptococcus pneumoniae* by E-test.

	MIC of Erythromycin µg/ml	No. of examined isolates	MIC of Azithromycin µg/ml	No. of examined isolates	MIC of Clarithromycin µg/ml	No. of examined isolates
Strept. pneumoniae isolates	64	2	64	6	32	6
	48	3	32	1	16	2
	32	3	24	1	12	1
	24	2	16	4	8	1
	16	1	8	3	6	3
	12	2	6	2	4	2
	8	3	4	2	3	4
	6	1			2	2
	4	3				
	3	4				

Table 4: The percentage of erythromycin resistance genes in *Strept. pneumoniae* isolates (24) using PCR.

Erythromycin resistant genes	No. & % of Erythromycin resistant *Streptococcus pneumoniae* strains	
	NO.	%
Erm B only	2	(8.3%)
Mef E only	8	(33.3%)
Combined *erm* B & *mef* E	10	(41.6%)
None of the above genes	4	(16.7%)

Table 5: The relation between *erm* and *mef* genes with MIC values of resistant strain of erythromycin.

Determinant gene	E test MICs (µg/ml.)								
	3	4	6	8	12	24	32	48	64
Erm (n= 2)		1			1				
Mef (n= 8)	1	2	1	3	1				
Both (n= 10)						2	3	3	2

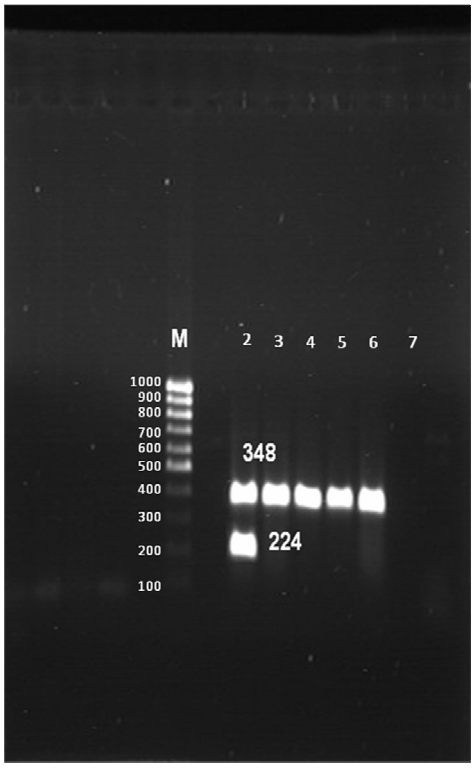

Fig. 2: Agarose gel electrophoresis of amplified *erm* B and *mef E* gene in *Streptococcus pneumoniae* isolates, Lane (1): DNA marker 100 bp, Lane (2): *erm* B gene (224 bp), Lane (2,3,4,5,6): *mef* E gene (348 bp), Lane (7): negative control.

Otitis media is the most prominent reason for antimicrobial use in a pediatric population, but the role of antibiotics in the treatment of this disease has remained controversial and a global trend of increasing antimicrobial resistance, with wide variations at national levels is well documented. Strong evidence supports an association between antibiotic use and resistance[12.]

Since erythromycin resistance was first detected in 1967 in USA, macrolide resistance has been increasing globally with increased use of this antibiotic[1.] An increase in macrolide resistance is associated with an increase in macrolide use[13.]

This study aimed to estimate the incidence of *Strept. pneumoniae* among otitis media cases, to perform the antimicrobial sensitivity test isolates, to determine the resistance to erythromycin and some macrolides (clarithromycin and azithromycin) and to detect the frequency of common marolide resistant genes(The *mef E* and *erm B* genes) among macrolide resistant isolates by PCR technique.

Samples were collected from middle ear fluid from 317 cases representing multiple ages and both sexes, who were enrolled from the outpatient clinics of Al-Azhar hospital in Assiut.

Out of the 317 cases of otitis media, 78 isolates of *Streptococcus pneumoniae* were obtained (24.6%). Of the total 78 *Strept. pneumoniae* strains in this work 51 strains (65.4%) were isolated from patients under 10 years old. Similar findings were reported by several studies, which evaluated young age risk factor associated with nasopharyngeal carriage of *Strept. pneumoniae*[14]. Concerning resistance of our isolates to macrolides; a total of 30.7%, 26.9% and 24.4% of isolates were resistant to erythromycin, clarithromycin and azithromycin respectively. The erythromycin resistance rate observed in our study is significantly higher than the resistance rate among isolates from the Netherlands (2.6%) as well as the resistance rate reported in Spain (17.1%)[15.]

For accurate quantitative determination of macrolide resistance, the MICs were estimated using E test. MICs range of erythromycin, clarithromycin and azithromycin isolates were (3-64 µg/ml), (2-32 µg/ml) and (4-64 µg/ml) respectively. The interpretive criteria ranges as given by the E test manufacturer refers to break points of resistant strains of *Strept. pneumoniae* at $\geq$ 1 µg/ml, $\geq$ 1 µg/ml. qnd $\geq$ 2 µg/ml for erythromycin, clarithromycin and azithromycin respectively. Therefore, it can be concluded that the erythromycin, clarithromycin and azithromycin breakpoints adjusted for our method worked well.

It has been shown that pneumococci resistant to erythromycin mainly have one or both distinct resistance determinants, *erm*(B) and or *mef*(E)[14.] Detection of resistance determinants (*mef* E and *erm* B) genes in our 24 erythromycin-resistant *S. pneumonia* isolates by PCR showed that *erm* B & *mef* E genes were detected at 224 and 347 bp respectively. These results correlate with previous findings[16-19.]

Analysis of our results regarding erythromycin resistance determinants in the complete set of 24 isolates showed that 33.3% harbored the *mef* genes, 8.3% the *erm* genes

and 41.6% both the *mef* and the *erm* genes. In North-American countries, the *mef* genes are more prevalent in *Strept. pneumoniae*[20&21.] The *mef* gene was observed to be the most frequent macrolide resistance gene and is more comparable with North America and Scotland than continental Europe[20&21.]

On the global level, *erm*(B) appears to be the most common macrolide resistance determinant in pneumococci. According to a recent study, its prevalence was 55% where as the respective figure for the *mef* gene was 31%[22].

It is worth mentioning that analysis of our results showed a satisfactory relation between detection of resistance determinant genes and values of MICs of resistant strains. Detection of both genes was distinguished in resistant strains showing MICs of ≥ 24 µg/ml. for erythromycin. These findings are correlate with the results of Farrell *et al.*[22], who reported that resistance determinant genes could be observed in strains resistant to erythromycin with MICs of ≥ 24 µg/ml.

Conclusion

In regard to the high prevalence of erythromycin resistance, there were nearly 30% of isolated pneumococci non susceptible to erythromycin. Therefore, care should be taken before treatment of pneumococcal infections with macrolides after susceptibility testing to avoid possible treatment failures. Results points to the importance of detection of *erm*(B) and *mef*(E) genes for epidemiological purposes to track possible presence of macrolide resistance. It has been suggested that to reduce the antimicrobial prevalence in pneumococcus, a large reduction in antimicrobial consumption is needed on the population level. To summarize controlling antimicrobial resistance, a multidisciplinary approach is therefore needed that includes continuous surveillance, education and feedback.

REFERENCES

1- R. Leclercq and P. Courvalin, "Resistance to macrolides and related antibiotics in *Streptococcus pneumoniae*", Antimicrobial Agents and Chemotherapy, 46, 2727-2734 (2002).

2- S. Kodama, T. Hirano, S. Suenaga, N. Abe and M. Suzuki, "Eustachian tube possesses immunological characteristics as a mucosal effector site and responds to P6 outer membrane protein of nontypeable *Haemophilus influenzae*", Vaccine, 24 (7), 1016-1027 (2005).

3- S. K. Obaro, "Prospects for pneumococcal vaccination in African children", Acta. Trop., 75, 141-153 (2000).

4- L. K. Pickering, C. J. Baker, D. W. Kimberlin and S. S. Long, Editors. "Red Book", "Report of the Committee on Infectious Diseases", 28th Ed., Elk Grove Village, IL: American Academy of Pediatrics, 2009, pp. 524-35.

5- A. E. Bridy, M. B. Margolis, K. J. Center and D. J. Isaacman, "*Streptococcus pneumoniae*: description of the pathogen, disease epidemiology, treatment and prevention", Pharmacotherapy, 25, 1193-112 (2005).

6- C. Myers and A. Gervaix, "*Streptococcus pneumoniae* bacteraemia in children.", Int. J. Antimicrob. Agents, 30, S24-8 (2007).

7- M. A. Barocchi, S. Censini and R. Rappuoli, "Vaccine in the era of genomics: The pneumococcal challenge", Vaccine, 25, 2963-73 (2007).

8- P. Homoe, R. B. Christensen and P. Bretlau, "Acute otitis media and sociomedical risk factors among unselected children in greenland", International Journal of Pediatric Otorhinolaryngology, 49 (1), 37-52 (1999).

9- M. M. Rovers, A. G. M. Schilder, G. A. Zielhuis and R. M. Rosenfeld, "Otitis media", The Lancet, 363, 465-473 (2004).

10- S. Surzychi, "General Aspects of DNA Isolation and Purification" Ch. 16 "PCR Analysis: In Basic Techniques in Molecular Biology", Library of Congress Springer-Verlag, Berlin Heidelberg-Germany, 2000, p. 228.

11- J. Sutcliffe, A. Tait-Kamradt and L. Wondrack, "*Streptococcus pneumonia*e and *Streptococcus pyogenes* resistant to macrolides but sensitive to clindamycin: a common resistance pattern mediated by an efflux system", Antimicrobial Agents and Chemotherapy, 40, 1817-1824 (1996).

12- C. Werner, L. Albrich, L. Dominique, M. Monnet and Stephan Harbarth, "Antibiotic selection pressure and resistance in *Streptococcus pneumoniae* and *Streptococcus pyogenes*", Emerging Infectious Diseases, 10 (3), 76 (2004).
13- M. Bergman, S. Huikko, P. Huovinen, P. Paakkari and H. Seppala, "Macrolide and azithromycin use are linked to increased macrolide resistance in *Streptococcus pneumonia*". Antimicrobial Agents and Chemotherapy, 50, 3646-3650 (2006).
14- E. Backhaus, S. Berg, B. Trollfors, R. Andersson, E. Persson, B. E. Claesson, P. Larsson, E. Ek, L. Jonsson, G. Radberg, S. Johansson, T. Ripa, D. Karlsson and K. Andersson, "Antimicrobial susceptibility of invasive pneumococcal isolates from a region in south-west Sweden 1998-2001", Scand. J. Infect. Dis., 39, 19-27 (2007).
15- Li Yang, H. Tomita, Y. Lv, J. Liu, F. Xue, B. Zheng and Y. Ike, "Molecular characterization of *erm*(B)- and *mef*(E)-mediated erythromycin-resistant *Streptococcus pneumoniae* in China and complete DNA sequence of Tn 2010", J. Appl. Microbiol., 1364-1369 (2010).
16- G. Ackermann and A. C. Rodloff, "Drugs of the 21st Century: Telithromycin (HMR 3647) the first ketolide", J. Antimicrob. Chemother., 51, 497-511 (2003).
17- A. Altraja, P. Naaber, E. Tamm, S. Meriste, A. Kullamaa and H. Leesik, "Antimicrobial susceptibility of common pathogens from community-acquired lower respiratory tract infections in Estonia", J. Chemother., 18, 603-609 (2006).
18- P. G. Ambrose, "Antimicrobial susceptibility breakpoints: PK-PD and susceptibility breakpoints", Treat Respir. Med. 4, Suppl., 1, 5-11 (2005).
19- J. Aspa, O. Rajas and F. R. de Castro, "Pneumococcal antimicrobial resistance: therapeutic strategy and management in community-acquired pneumonia", Expert. Opin. Pharmacother., 9, 229-41 (2008).
20- A. Al-Lahham and R. R. Reinert, "Time-kill kinetics of *Streptococcus pneumoniae* with reduced susceptibility to telithromycin", Chemotherapy, 53, 1903 (2007).
21- K. Zakikhany, M. A. Degail, T. Lamagni, P. Waight, R. Guy, H. Zhao, A. Efstratiou, R. Pebody, R. George and M. Ramsay, "Increase in invasive *Streptococcus pyogenes* and *Streptococcus pneumoniae* infections in England, December 2010 To January 2011", Eurosurveillance, 16 (5), 176 (2011).
22- D. J. Farrell, C. Couturier and W. Hryniewicz, "Distribution and antibacterial susceptibility of macrolide resistance genotypes in *Streptococcus pneumoniae*: PROTEKT Year 5 (2003-2004)" Int. J. Antimicrob. Agents, 31, 245-9 (2008).

نشرة العلوم الصيدلية
جامعة أسيوط

مقاومة ميكروب ستربتونيومونى المعزول من حالات التهاب الأذن الوسطى للماكروليد

نبيلة رشوان[1] – أمانى جمال ثابت[1] – نهى عبد الحليم عفيفى[1] – رحاب صلاح موسى[2]

[1]قسم الميكروبيولوجيا الطبية والمناعة ، كلية الطب ، جامعة أسيوط

[2]مستشفى جامعة الأزهر بأسيوط ، أسيوط ، مصر

يهدف هذا العمل لتحديد مقاومة سلالات الميكروب المكور الرئوي للمضادات الحيوية بمجموعة الماكروليد. وقد أجري هذا العمل علي ٣١٧ حالة من العيادة الخارجية لقسم الأنف والأذن والحنجرة وقسم الأطفال بمستشفي جامعة الأزهر بأسيوط في الفترة ما بين ٢٠٠٩–٢٠١١م وتم تجميع عينات من إفرازات الأذن الوسطي بلغت فى مجملها ٣١٧ حالة ، وتمثل ١٦١ حالة من الذكور و١٥٦ حالة من الإناث ، ومختلف المجاميع العمرية من ٦ أشهر إلي ٧٥ سنة ، حيث يمثل الأطفال أقل من ١٠ سنوات ١٦٩ حالة من مجموع الحالات. قد تم عزل ٧٨ سلاله معظمها من الأطفال تحت عمر ١٠ سنوات (٥١ سلالة) ، ومنهم ٦٦ سلالة من ١٩٦ حالة التي تعاني التهاب أذن وسطي حاد و١٢ سلالة من ١٢١ حالة تعاني التهاب اذن وسطى مزمن وكذلك ٤٥ سلالة من الذكور و٣٣ سلالة من الإناث. بإجراء اختبار الحساسية ثبت أن ٢٤ (٣٠,٧%) منها مقاومة للإرثروميسين ، ٢١ (٢٦,٩%) مقاومة للكلارثروميسين ، ١٩ (٢٤,٤%) مقاومة للأزثروميسين. وفي اختبار البلمرة للكشف عن الجينات الدالة علي المقاومة تبين أن ٣٣,٣% من السلالات تحتوي علي جين *mef* ، ٨,٣% تحتوي علي جين *erm* ، وأن ٤١,٦% تحتوي علي كلا الجينين. وظهر الجينان *erm* B ، *mef* E عند ٢٢٤ و ٣٤٧ bp علي التوالي.