ORIGINAL ARTICLE

In-vitro Susceptibility of Levofloxacin against Different Clinical Isolates

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ABSTRACT

Background: Levofloxacin is a broad spectrum quinolone, widely used to treat infections caused by gram negative and gram positive bacteria. Development of resistance by pathogens against different broad-spectrum antibiotics is increasing and now becoming a global issue.

Objectives: The aim of the study is to evaluate the current sensitivity pattern of levofloxacin against various common clinical isolates like *Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa,and Klebsiellapneumoniae.*

Methods: A total of one hundred and ten samples were collected from different pathological laboratories of Karachi, Pakistan. The above mentioned pathogens were isolated from blood, stool/urine, sputum, skin samples.

Results: Results show least resistance of levofloxacin against *E.coli* (27.5%), and *P.aeruginosa* (27%), while *S.aureus* possessed highest resistance (45%).

Conclusion: Study concluded levofloxacin still possesses excellent anti-microbial activity against common pathogens. Routine monitoring and surveillance is further required to ensure effective treatment regimens to community.

KEY WORDS: *Levofloxacin, Resistance, Susceptibility, Clinical Isolates, Pathogens.*

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INTRODUCTION

In early 1960s the development of quinolones was initiated. Nalidixic acid, was granted a license to be used in the treatment of urinary tract infections (UTIS), mainly caused by gram negative bacteria, in 1967. In the initial days of the usgae, Quinolones were resisted by gram negative bacteria.[1] The first monofluroquinolone, flumequine, exhibited improved sensitivity against gram positive pathogens in comparison to nalidixic acid due to structural modifications.[2] Off late, quinolones have been widely used to treat bacterial infections, with ciprofloxacin as an effective member of the class, having excellent bioavailability and active drug efflux.[3]

Levofloxacin, a broad spectrum antibiotic quinolones, is found to be effective against a variety of the clinical isolates, especially *Enterococcus spp*. and *S. pneumonia*. Among all quinolones levofloxacin is strongly active against both gram positive and gram negative bacteria. It is two times more effective than ofloxacin against *Enterobacteriaceae* and *Pseudomonas aeruginosa*.[4,5] Additionally it also bears potential therapeutic response over *Pasteurella species, Eikenella, Corrodens, Legonella, Pneumophilia and BactoridesFragilis*.[6] The minimum inhibitory concentration (MIC) of levofloxacin is 4-8 ug/ml against *Pseudomonas aeruginosa* while for *Heamophilus influenza, Neisseria gonorrhoeae* and *Moraxella catarrhalis,*MIC is around 0.015-0.06 ug/ml.[7,8,9] The effectiveness of levofloxacin against *S.pneumoniae* infections was also reported.[10,11,12] The antibiotic has been utilized in the treatment of ear infections in children.[13]

The objective of the study was to determine the in-vitro susceptibility of levofloxacin against common pathogens like *Escherichia coli, Staphylococusaureus, Pseudomonas aeruginosa, and Klebsiella pneumonia*using Baur-Kirby method.

METHODOLOGY

Clinical isolates were collected from different pathological laboratories of Karachi, Pakistan from January 2013 to May 2013. Pathogens were isolated from pus, sputum, stool, urine and blood samples. Susceptibility of levofloxacin was determined using disk diffusion method in laboratory to produce consistent results with bacterial isolates. Commercially prepared disc of levofloxacin (5*µ*g) was purchased from the local market (Oxoid Ltd., England). Muller Hinton Agar (Oxoid, England) and broth were prepared according to standard guidelines provided by CLSI (Clinical and Laboratory Standard Institute).[14] McFarland standard 0.5 was used and prepared.[15] Commercial discs of levofloxacin were placed on dry inoculated streaked plates using sterile forceps, and incubated at 37°C for 18-24 hours. After incubation, the zones of inhibition appeared around the discs were measured using scale. The zones of inhibition for *E.coli, K.pneumoniae*, and *P.aeruginosa*, were set as resistant (≤13), intermediate resistant (14-16mm), and sensitive (≥17mm). While the zones for *S.aureus*were resistant (≤15mm), intermediate resistant (16-18mm), and sensitive (≥19mm).[14, 15]

RESULTS

Pathogens were isolated by blood, stool, urine, pus and sputum. The detail of sources is given in Table 1. Percent susceptibility of E.coli (72.5%), *S.aureus* (55%), *P.aeruginosa* (73%), *and K.pneumoniae* (66%) showed *P.aeruginosa* to be more susceptible towards levofloxacin as compared to other tested pathogens. Table 2 presents the number of pathogens resistant (isolates not inhibited by normal dose of the anti-microbial agent or lack of insignificant zone around experimental disc), intermediately resistant (lower than susceptible response of isolates with smaller diameter zones around the experimental discs; clinically disregarded as higher doses can be used to treat infections and susceptible (isolates inhibited by normal concentration of drug and significant zones are appeared around the experimental disc).[14]

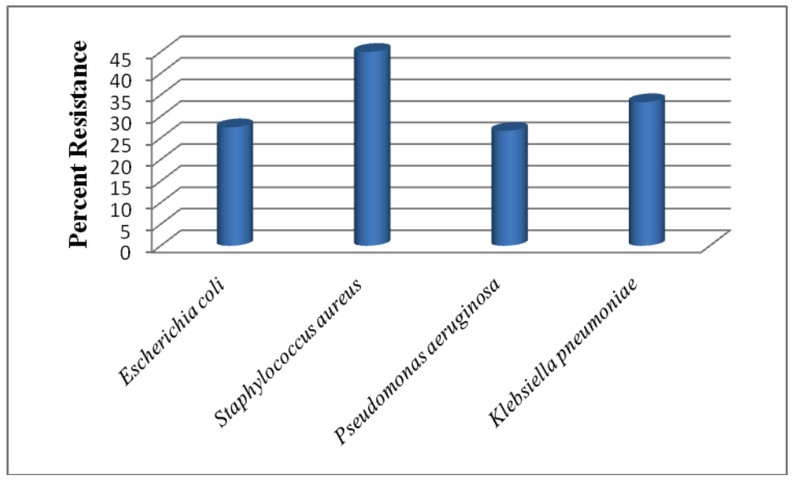
Table 1: Sources of Clinical Isolates

S. No.	Pathogens	Sources				
		Blood	Stool/Urine	Skin Pus	Sputum	Sample Size
1	*Escherichia coli*	14	23	3	-	40
2	*Staphylococcus aureus*	12	20	8	-	40
3	*Pseudomonas aeruginosa*	3	5	3	4	15
4	*Klebsiellapneumonia*	3	3	2	7	15

Table 2: Sensitivity of Levofloxacin against Clinical Isolates

S. No.	Pathogens	*Resistant (R)*	*Intermediate Resistant (IR)*	*Sensitive (S)*
1	*Escherichia coli*	08	03	29
2	*Staphylococcus aureus*	10	08	22
3	*Pseudomonas aeruginosa*	02	02	11
4	*Klebsiellapneumoniae*	02	03	10

Figure 1: Percentile Resistance of Levofloxacin against Clinical Isolates



DISCUSSION

Resistance to a variety of antimicrobial drugs is rising throughout the world.[16] The emergence of antibiotic resistance is mainly due to needless use of antibiotics in humans and animals. Risk factors for the increase of resistant bacteria in hospitals and the community can be summarized as over-crowding, lapses in hygiene or poor infection control practices.[17] In present study sensitivity pattern of levofloxacin was determined against 40 samples of *Escherichia coli,* 40 of *Stahylococcusaureus,* 15 of *Klebsiellapneumoniae* and 15 of P*seudomonas aeruginosa*. In a previous study, 200 clinical isolates were tested including the species *Escherichia coli*, *Klebsiellapneumoniae*, *Proteus mirabilis, Proteus vulgaris*, *Providenciarettgeri*, *Pseudomonas aeruginosa*, *Enterococcus faecalis*, *Staphylococcus aureus* and *Staphylococcus epidermidis.*[18] *Findings indicated all isolates of E.coli were susceptible to levofloxacin with similar results.*[17,19] *The sensitivity of levofloxacin against S. aureus was 55%*.While past studies have shown good activity of Levofloxacin and ofloxacin against staphylococcal strains[20] compared with the majority of other antibiotics. Researchers reported 60.43% susceptibility of *S.aureus* to levofloxacin.[21] The comparatively lower susceptibility shows resistance has emergence against this fluoro-quinolone possibly due to irrational use of antibiotic, incomplete course of therapy and the self-medication.

The present study revealed only 2 pathogens of *K.pneumoniae* resistant to levofloxinwhile reports depict *K.pneumoniae* to be 100% susceptible to levofloxacin.[22] Another study showed 98% sensitivity of *K.pneumonia* towards levofloxacin[23] using CLSI disk diffusion technique.

Current susceptibility of *Pseudomonas aeruginosa* was 66% with a previous finding depicting greater anti-bacterial response than ciprofloxacin.[24] Comparable results of levofloxacin and ciprofloxacin against 300 *Pseudomonas aeruginosa* isolated from hospitalized patients are also available.[25] These results showed that the newer quinolones possessed good antimicrobial activity against various strains of gram positive and gram negative bacteria, however, rational and correct monitoring programs for its sensitivity should be conducted regularly in order to control the emergence of its resistance.

CONCLUSION

The present study shows that levofloxacin is still considered as a good choice for the treatment of infections caused by *E.coli, P.aeruginosa* and *K.pnemonia*. However, more investigations are required for *S.aureus*. Authors also suggested that the surveillance against such widely prescribed antibiotics must be done periodically to evaluate the current status of resistance against microbs

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ORIGINAL ARTICLE

Risk Factors for Nutritional Rickets in Children under 36 months: A Civil Hospital Case Study

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ABSTRACT

Background: Nutritional rickets is a common problem in Pakistan especially in Karachi with majority of the population living in enclosed housing and slums having limited or no sun exposure. There is a dearth of significant data regarding rickets in Pakistan especially in Sindh which emphasizes the need for further research. This study can be a foundation for other studies regarding strategies for prevention and early diagnosis of rickets.

Objectives: To determine the clinical presentation and identify risk factors for nutritional rickets in children less than three years of age.

Methods: A cross sectional study conducted in the department of pediatrics DUHS/CHK from June 11, 2007 to December 10, 2007. Fifty patients aged two months to thirty six months presenting with the clinical manifestation of rickets were included in the study. Information recorded included symptoms, socioeconomic status, feeding patterns, sun exposure, clothing, housing and malnutrition. Diagnosis was based on clinical signs, serum levels of alkaline phosphatase, calcium, phosphorus and radiological changes in X-ray wrist joint.

Results: Approximately 60% reported a weight for height less than ISD criteria set by WHO. Of the total assessed 58% percent were exclusively breast fed, 30% partial breast fed and 12% on formula milk. Weaning age was not reached in 20% of the children. Complementary feeding initiated late for 40% of the children with 78% percent exposed to sunlight less than 30 minutes per day and. Gross motor delay existed in 30% of children and hypocalcaemia convulsions in 14%. Past H/O repeated was in 32% had 22% had persistent/recurrent diarrhea.

Conclusion: Exclusivity breast feeding to complementary feed, inadequate exposure to sunlight and delayed introduction of complementary foods are the main risk factors for the development of nutritional rickets which can manifest itself in the form of ARI and diarrhea.

KEY WORDS: *Rickets, Vit-D Deficiency, Biochemical Abnormalities*.

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