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Outcome of Levofloxacin in the Treatment of Lower Respiratory Tract Infection

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Abstract **Original Research Article**

Background: Levofloxacin, a broad-spectrum fluoroquinolone antibiotic, is commonly used in treating lower respiratory tract infections (LRTIs) like pneumonia and chronic bronchitis. Its effectiveness lies in its ability to inhibit bacterial DNA gyrase, leading to bacterial cell death. Clinical outcomes of levofloxacin in LRTI treatment have generally been positive, with high rates of bacterial eradication and symptom resolution. ***Objective:*** The present research aimed to determine whether levofloxacin is an effective and safe option for treating lower respiratory tract infections. ***Method:*** From January 2022 to January 2023, researchers analyzed data from 120 patients with a lower respiratory tract infection at a tertiary hospital. Sixty patients were split evenly between a control group and an observation group. Levofloxacin was administered at the standard dosage to the control group and at a significantly higher dose to the observation group. Both the clinical efficacy and adverse reaction rates were compared and contrasted between the two groups statistically. ***Results:*** The cure rate in the observation group was 53.33 percent, which was substantially greater than the cure rate in the control group, which was 36.67 percent. There is a statistically significant difference between them (P 0.05). The overall efficacy rate of the observation group was 93.33%, significantly higher than that of the control group (73.33%). There is a statistically significant difference between them (P 0.05). There was no statistically significant difference (P>0.05) between the two groups due to the low incidence of adverse responses in both the observation and control groups. ***Conclusion:*** This research demonstrates that large dosages of levofloxacin have a stronger clinical curative impact on treating lower respiratory infections than lesser doses. It is worthwhile to promote the widespread adoption of this technique since it has the potential to greatly enhance the quality of patient care while posing little risk of unwanted reactions.

Keywords: lower respiratory tract infection, levofloxacin, effectiveness, safety analysis.

INTRODUCTION

Both young children and elderly people often have lower respiratory tract infections (LRTI). Low body immunity owing to co- presence of other illnesses is a major factor in the high death rate associated with LRTI, particularly in the elderly [1-3]. It is becoming more difficult to treat lung infections due to the widespread misuse of therapeutic antibiotics and the development of drug-resistant strains. Today, newer antibiotics are often used, such as quinolones, [4-5] rendering many older antibiotic compounds almost useless.

Multiple studies have shown that quinolones are highly bioavailable and have excellent tissue penetration and wide therapeutic index [5-6].

Levofloxacin belongs to the third generation of fluoroquin-olones, which have a broader antibacterial range, fewer adverse effects, and deeper tissue penetration than previous generations. According to research, [7] the standard dosage is two daily 200mg doses. There is ongoing research into the pharmacokinetics (PK) and pharmacodynamics (PD) of a wide variety of antibacterial medicines.

Recent research has shown that high-dose (55mg/750mg) levofloxacin is more helpful and makes more sense to use. The frequency of adverse drug responses did not increase and the medicine was generally well tolerated [7]. Although high-dose levofloxacin has been shown to be safe, many doctors are still wary of its use. Therefore, the purpose of these

clinical studies is to evaluate the efficacy of low- and high-dose levofloxacin in treating lower respiratory infections.

METHODS

This research was carried out in a tertiary hospital over the course of a year, beginning in 2022 and ending the following year. A total of 120 individuals were chosen and randomly assigned to either a control group or an observation group since they already had a lower respiratory tract infection.

Patients in both groups were given standard care, including measures to expel mucus, avoid asthma, and calm coughing, with the observation group also receiving levofloxacin via intravenous drip at a concentration of 0.5g/100ml.

The patients in the control group were given an intravenous drip of levofloxacin lactate injection at a concentration of 200 mg/100 ml. In all groups, therapy was discontinued when the clinical pulmonary infection score (CPIS) dropped to less than 6. Assessing the regular blood, urine, serum electrolyte, and blood sugar exams were performed on both groups to monitor the clinical efficacy of the continued therapy. When necessary, chest X-rays or computed tomography scans were also used.

Clinical Application of Antimicrobial Drugs Guiding Principles serves as the evaluation standard, and the following definitions are provided in accordance with that document- Cure: After receiving therapy, subjects showed no signs of illness;

Three or more of the five criteria for success (symptom, sign, hemogram, chest imaging, and sputum bacterial testing) were normalized or significantly improved; Efficient: patients reported a decrease in clinical symptoms after therapy; Clinical symptoms did not improve or worsen, and the treatment was ineffective. Treatment impact and adverse effect incidence rate of the two groups were monitored and assessed statistically during and after treatment.

SPSS® 18.0 was used to conduct all of the statistical analysis, with t-inspection and x2 inspection being the primary methods used. A p-value of less than 0.05 (p0.05) was used to indicate a statistically significant difference between the two sets of numbers.

RESULTS

Figure-1 shows age distribution of the study group where most of the patients belong to 42-51 years age group, 45%.

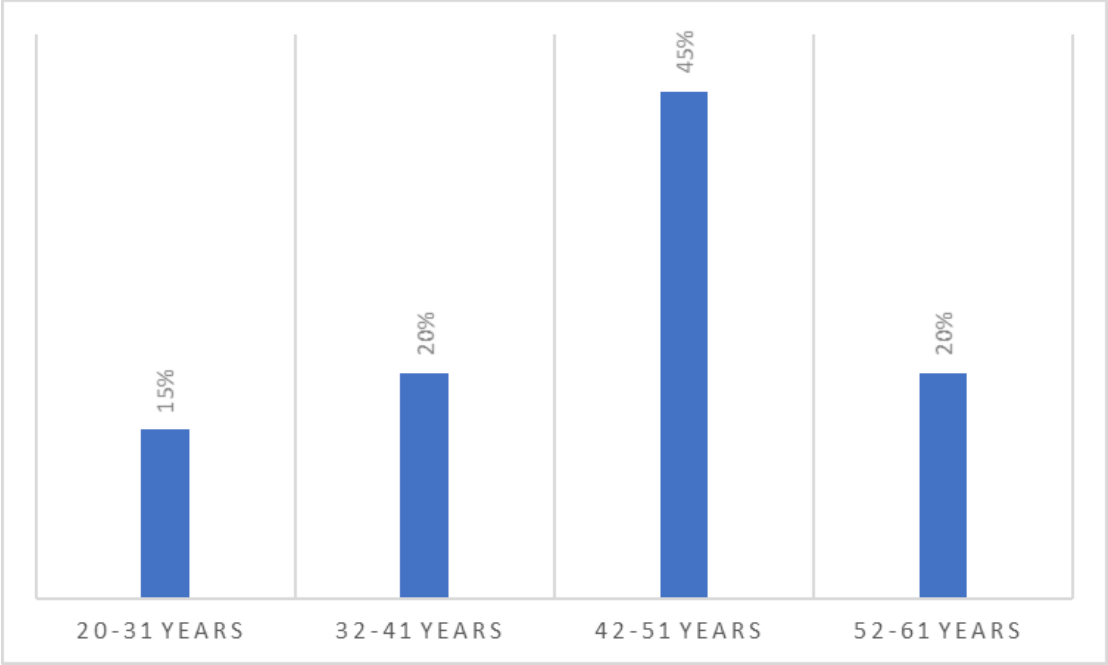

Figure-1: Age distribution

Figure-2 shows gender distribution where majority were female, 80%.

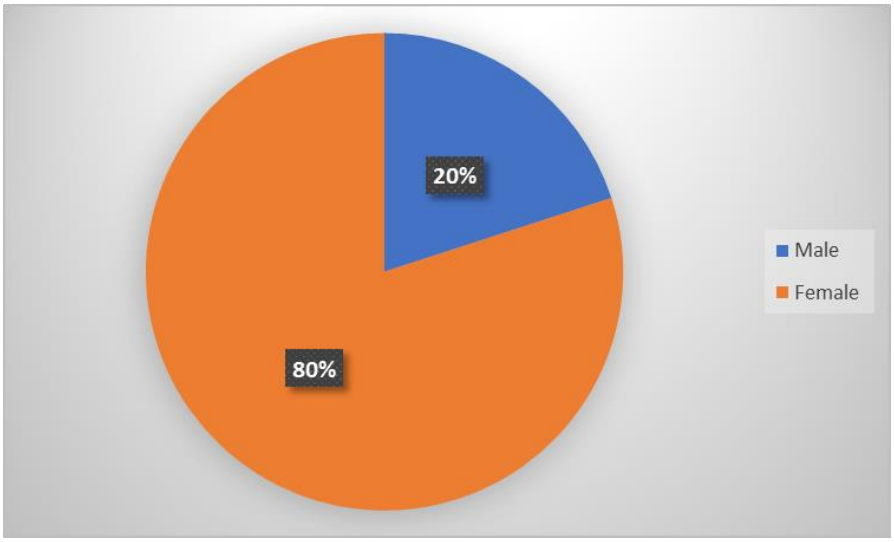

Figure-2: Gender distribution

Table-1 shows Comparison of treatment effectiveness between the two groups [n (%)]. The cure rate and the total rate of observation group are all obviously higher than control group (P<0.05).

Table-1: Comparison of treatment effectiveness between the two groups

Group	Cases	Cure rate	Obviously curative rate	Effective rate	Ineffective rate	Total effective rate
Observation group	60	32 (53.33%)	12 (20.00%)	12 (20.00%)	4 (6.67%)	93.33%
Control group	60	22 (36.67%)	16 (26.66%)	9 (15.00%)	13 (21.67%)	78.33%
P-value	-	<0.05	>0.05	>0.05	<0.05	<0.05

Table-2 shows Comparison of incidence rate of adverse effect between the two groups [n (%)]. There was no significant differences between the two groups (p>0.05).

Table 2: Comparison of incidence rate of adverse effect between the two groups

Group	Cases	Dizziness	Erythra	Agrypnia	Phlebitis
Observation group	60	1 (1.67%)	0 (0.00%)	1 (1.67%)	1 (1.67%)
Control group	60	2 (3.33%)	1 (1.67%)	0 (0.00%)	1 (1.67%)
P-value	-	>0.05	>0.05	>0.05	>0.05

DISCUSSION

Asthma, bronchitis, bronchiectasis, and pneumonia are all examples of lower respiratory infections. It's tough to pin down exactly what kind of pathogen is to blame, although it's usually some kind of Gram-negative bacteria. Abuse of antibiotics has contributed to a rise in the prevalence of multi-drug resistant bacteria and fungi [8-11]. To get over these obstacles, we need to analyze them from every angle possible. The concentration reflects the dates from extracorporeal measurements, which are the standard by which antibacterial activity of antibiotics is measured. Clinicians should consider both the long-term consequences and the possibility of drug resistance when making decisions concerning antibiotics and treatment programs. The term "mutant prevention concentration" (MPC) has been used in recent studies of the novel quinolone compounds. Mutant selection window is the dose of antibiotic at which the selected drug-resistant strain cannot develop [12-14]. When using antibiotics in clinical settings, it is important to reduce the mutant selection window by carefully choosing new medications, titrating the dosage, and sometimes even combining several antibiotics [15].

Levofloxacin, the laevo isomer of ofloxacin, demonstrates its pharmacological effects by inhibiting gyrase and topoisomerase activity in bacterial DNA, preventing the DNA from being synthesized and replicated, and killing the bacteria [16-17]. Levofloxacin's antibacterial action is concentration dependant, like that of many other antimicrobial medicines. The greater the concentration, the more effective the bactericidal effect. Peak concentration to MIC ratio is the primary PK/PD metric. The ratio's magnitude is very sensitive to the success of the treatment in eliminating the germs. There is evidence from clinical trials that a high dosage of levofloxacin may inhibit drug synthesis and rapidly eradicate bacteria. The pace of sterilization is increased due to the shorter exposure period of germs. Emerging medication

resistance may also be avoided by lowering the bacterial count or the proportion of allergic lower subgroup bacteria [18-20]. Whereas our study shows that there was no correlation between the dosage of levofloxacin and the incidence of side effects.

CONCLUSION

We conclude that using a high dosage of levofloxacin to treat lower respiratory tract infections is feasible, cost-effective, and may improve patient compliance. In addition to enhancing patients' clinical efficacy, its great clinical value and safety also make it an attractive option.

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