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Efficacy and Safety of Garenoxacin versus Moxifloxacin in Acute Exacerbation of COPD: A Comparative Study

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Abstract
Aim: *The aim of the present study was to compare the efficacy and safety of Garenoxacin with that of Moxifloxacin for the treatment of patients of Acute exacerbations of COPD.*
Material and Method: *This study was a prospective, open label, observational, comparative study; where clinically diagnosed COPD patients of either sex in age group of 25-70 years with clinical symptoms suggestive of Acute exacerbations of chronic obstructive pulmonary disease (AE-COPD) were enrolled. After obtaining written informed consent, Patients were divided into two treatment groups. Group A Moxifloxacin 400 mg once daily for 5 days while group B received Garenoxacin 400 mg once daily for 5 days. Primary outcome measure (cure, improved, failure), that is clinical success rate is assessed at day 14.*
Result: *Mean age (± 2SD) of the COPD patients in Garenoxacin group was 60.98 ± 10.67 whereas in Moxifloxacin group the mean age (± 2SD) was 57.80 ± 10.27. In Garenoxacin group, 14 patients achieved cure and rest 36 patients achieved improved whereas in Moxifloxacin group, 8 patients achieved cure, 41 patient achieved improvement and 1 patient did not respond to treatment and was termed failure. Observed adverse event were few, mild and self limiting in both group.*
Conclusion: *5-day course of Garenoxacin is therapeutically comparable to Moxifloxacin in terms of clinical effectiveness in AECOPD.*
Keywords- *Acute exacerbations of COPD, Garenoxacin, Moxifloxacin.*

Introduction

Chronic obstructive pulmonary disease (COPD) is a very common respiratory condition involving the airways and characterized by airflow limitation [1]. As it involves >5 % of the population and is linked with high morbidity and mortality [2].

Correct diagnosis of COPD is of great importance because with appropriate management one can decrease symptoms, reduce the frequency and

severity of exacerbations, and prolong survival [3]. Acute exacerbation of COPD (AECOPD) are commonly precipitated by bacterial or viral infection and some environmental factors (air pollution or cold temperatures). [4]

Garenoxacin is a des-fluoro quinolone which is lacking a fluorine component at C6.[5] Therapeutic concentration of Garenoxacin was higher than the MIC90 of major causative pathogens. Garenoxacin is free from the class adverse effects of fluoroquinolones (FQ). Garenoxacin a novel desfluoroquinolone appears to be an ideal antimicrobial agent for the treatment of various respiratory tract infections. [6]

Garenoxacin is one of the most active quinolones tested against gram-positive bacteria, particularly against Methicillin Resistant Staphylococcus Aureus, Staphylococcus. epidermidis, and Streptococcus pneumonia.

Garenoxacin is also active against antianaerobic bacterias, fastidious microbes, Enterobacteriaceae and most of the nonfermenters. So thats why the wide antibacterial spectrum of Garenoxacin supports its development for a broad range of indications.[7]

Garenoxacin has a favourable pharmacokinetic profile, a good clinical response rate and is well tolerated. Studies have concluded that Garenoxacin is an important new quinolone for the treatment of respiratory tract and otorhinolaryngological infections.[8]

In the present study, effort was made to compare the efficacy of Garenoxacin with that of Moxifloxacin for the treatment of patients of Acute exacerbation of COPD.

Material and Method

This study was a prospective, open label, observational, comparative, single center study which was undertaken for a study period of 1 year, i.e. from January 2014 to January 2015 duly after taking permission from the Institutional Ethical Committee. The study was conducted in the department of Pharmacology and TB and Chest, Government Medical College, Haldwani.

The patients were diagnosed clinically by the physician in the OPD of TB & Chest Department of Government Medical College, Haldwani. Diagnosed COPD patients of either sex in age group of 25-70 years with clinical symptoms suggestive of Acute exacerbations of COPD (AECOPD) were enrolled. Patients with AE COPD should present ≥2 of the following signs and symptoms, Fever, Cough, with /without Sputum, Chest pain, Wheezing, Dyspnoea.

After obtaining written informed consent, Patients were divided into two treatment groups. Group A received, Moxifloxacin 400 mg once daily for 5 days while group B received, Garenoxacin 400 mg once daily for 5 days.

Primary outcome measure-

Clinical success rate was evaluated at day 14th from starting the treatment, and can be categorised into cure, improved and failure, which were defined as,

Cure – complete disappearance of clinical signs and symptoms within treatment period.

Improved – subsidence of clinical signs and symptoms by < 50 % but with incomplete resolution.

Failure – unchanged or worsening of baseline clinical signs & symptoms.

Safety assessment

Observation of side effects of treatment in both groups during the study period was done by subject as well as investigator and recorded as adverse event .Causality analysis was done using the World Health Organization-Uppasala Monitoring Centre (WHO-UMC) criteria.

For statistical analysis, SPSS version 21 was used. Statistical test was applied using Chi square test and Independent sample 'T' test was used. Categorical data parameters were presented in the form of frequency and percent. Comparison was performed by chi-square test for categorical data. To compare mean values Independent sample 'T' test was used. For this study, the Confidence Interval percentage was 95% and result was considered significant if the P-value was less than 0.05.

Result

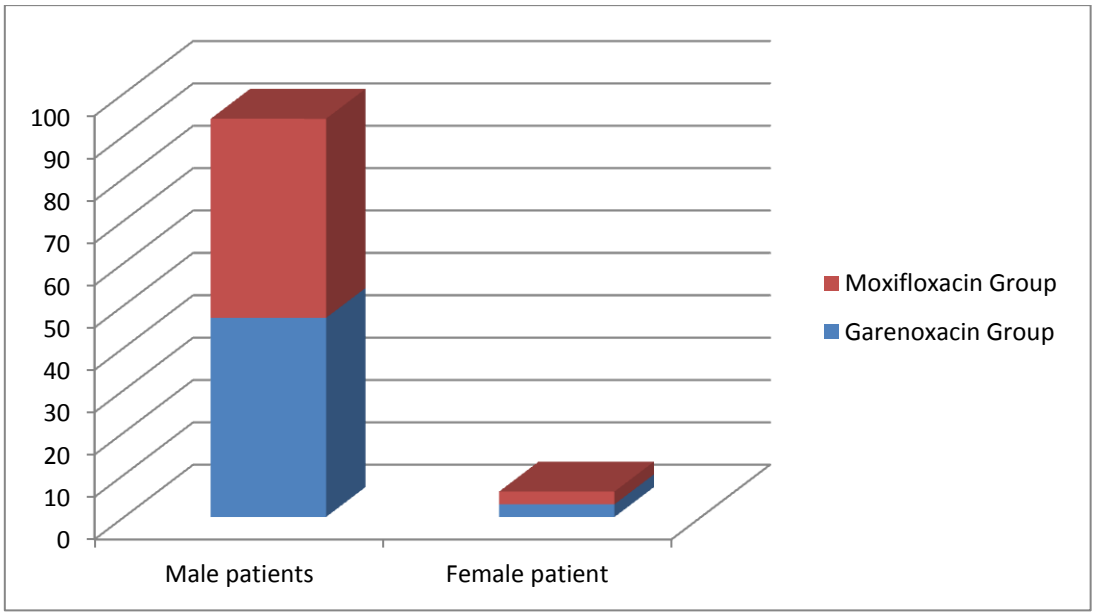
Demographic data (Table 1)

In both the groups, there are 3 females and 47 males, suggesting male preponderance of the disease.

Mean age ± 2SD in Garenoxacin group is 60.98 ± 10.67 whereas in Moxifloxacin group the mean age ± 2SD is 57.80 ± 10.27.

Table 1 : Demographic data

	Garenoxacin Group (n=50)	Moxifloxacin Group (n=50)
Number of male patients (%)	47 (94%)	47 (94%)
Number of female patients (%)	3 (6%)	3 (6%)
Mean Age ± 2 SD	60.98 ± 10.67	57.80 ± 10.27



History of smoking (Table 2)

Maximum patients in both the group are smoking for more than 10 years. 41 patents from Garenoxacin Group and 39 patents from Moxifloxacin Group are smokers for more than 20 years. Mean smoking years ± 2SD in Garenoxacin group is 32.22 ± 10.45 years whereas in Moxifloxacin group the mean smoking years ± 2SD is 27.94 ± 12.95 years.

Table 2 : History of smoking

SMOKER SINCE	Garenoxacin Group (n=50)	Moxifloxacin Group (n=50)
< 10 YEAR	1	5
10 -20 YEARS	8	6
21 -30 YEARS	15	23
31 -40 YEARS	18	10
41 -50 YEARS	8	6

Patients' presentation (Table 3)

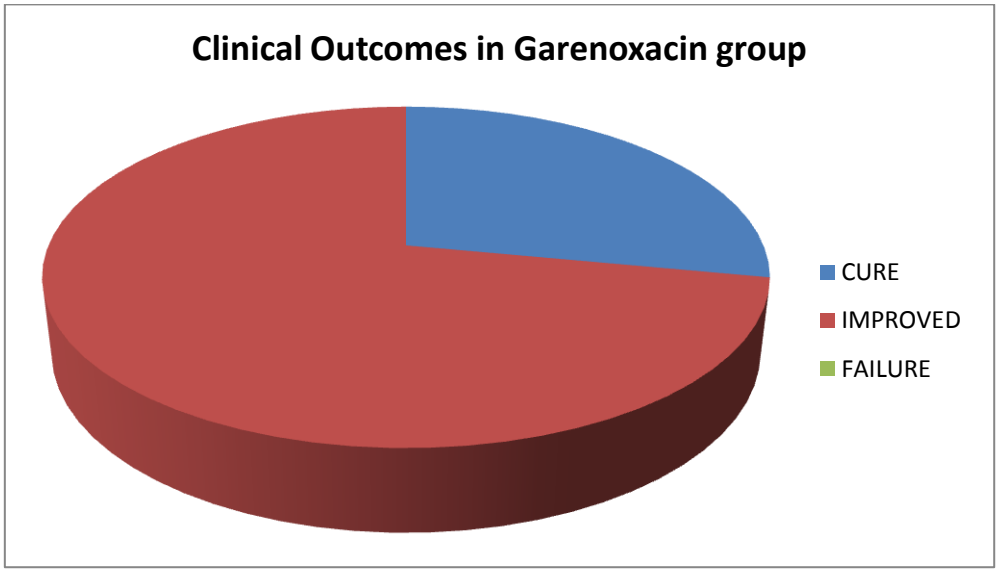
Most patients came to TB and chest OPD with chief complains of cough, fever and dyspnoea. Some patients also have productive cough.

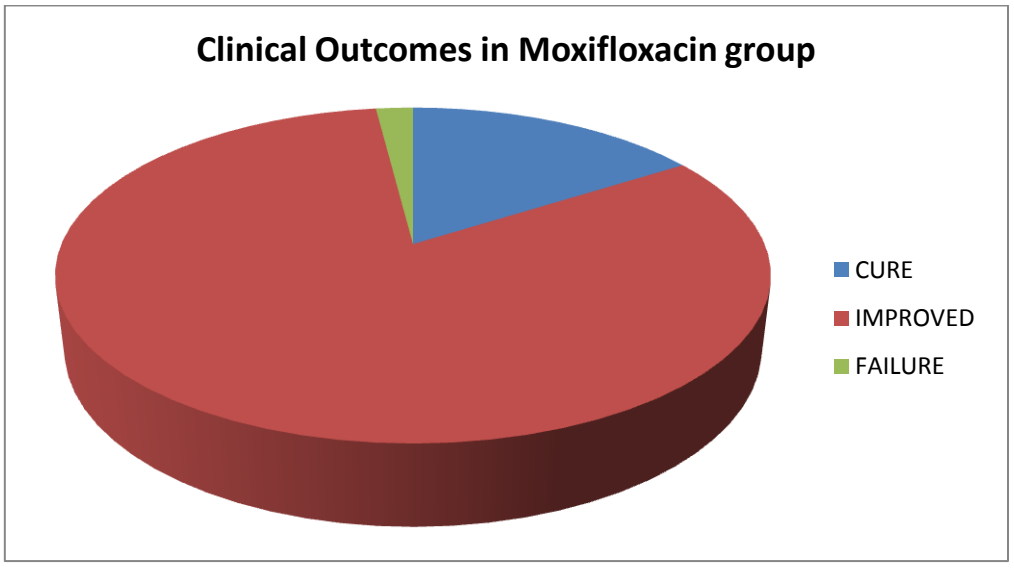
Table 3 : Patients signs and symptoms			
Signs And Symptoms	Garenoxacin Group (n=50)	Moxifloxacin Group (n=50)	P-value
FEVER	33 (66%)	33 (66%)	0.583
COUGH	40 (80%)	39 (78%)	0.5
SPUTUM	19 (38%)	13 (26%)	0.142
DYSPNOEA	38 (76%)	36 (72%)	0.41
RONCHI	12 (24%)	6 (12%)	0.09
CHEST PAIN	2 (4%)	8 (16%)	0.046

Clinical Outcome (Table 4)

In Garenoxacin group, 14 patients achieved cure and rest 36 patients achieved improved whereas in Moxifloxacin group, 8 patients achieved cure, 41 patient achieved improvement and 1 patient did not respond to treatment and was termed failure.

Table 4 : Clinical Outcome			
	Garenoxacin Group (n=50)	Moxifloxacin Group (n=50)	p- value
FAILURE	0	1 (2 %)	0.190
IMPROVED	36 (72%)	41 (82%)	0.228
CURE	14 (28%)	8 (16%)	0.186





Safety analysis was done and only five Adverse Event (AEs) were noted during the entire study period - three AEs in Moxifloxacin group, which were of mild diarrhea, and two AEs in Garenoxacin, one case of diarrhea and one of dizziness.

These AEs were non-serious and mild in nature and did not require any dose reduction or withdrawal of the study medications. Causality analysis using the World Health Organization-Uppasala Monitoring Centre (WHO-UMC) criteria showed that they were in the "possible" category.

Discussion

The present study was a comparative study, done to compare the efficacy of Garenoxacin with that of Moxifloxacin for the treatment of patients of Acute exacerbation of COPD. The demographic data in both the groups were comparable. In the present study, the mean age ± 2SD in Garenoxacin group was 60.98 ± 10.67 whereas in Moxifloxacin group the mean age ± 2SD was 57.80 ± 10.27, which concurs with the global study. [9]

In the present study, maximum number of patients in both the group is smoking for more than 10 years and many studies concur with the fact that smoking leads to aggravation of the disease. [10]

The causal relationship between cigarette smoking and the development of COPD has been absolutely proved, but there is substantial variability in the response to smoking among the population. [11]

As the present study, suggests male preponderance of the disease which is supported by the world's history suggests the higher rate of smoking among males is the possibly the explanation for the higher prevalence of COPD among males however, the prevalence of COPD among females is also increasing as the gender gap in smoking rates has decreased in the last 50 years.[11]

The 3 most common complain patients with COPD come to OPD with are cough, sputum production and dyspnoea which is similar to the presentation of disease by the study subjects.[11] Although , in the study, patients also report of fever in higher frequency.

In the present study, both Garenoxacin and Moxifloxacin shows comparable response against acute exacerbation of COPD, and various studies supports this result, like a study conducted by Anzueto A et al, suggesting that 5-day fluoroquinolone therapy is associated with faster recovery, fewer relapses, prolonged duration between subsequent episodes of exacerbation, and lesser hospitalization when compared with standard therapy. [12]

Patients with one or more of these risk factors may benefit most from fluoroquinolones. [13]

When fluoroquinolones are used in acute exacerbations of COPD, the newer members of the class should be used as they have favorable pharmacokinetic and pharmacodynamic characteristics, a broad spectrum of cover, fewer drug interactions, as well as a lower potential for the development of resistance. [14, 15]

Moxifloxacin and Garenoxacin showed similar adverse event profiles in the present study. Gastrointestinal problems like diarrhea, were the most common drug-related adverse events. There were no serious adverse events that were related to both drugs. Both drugs were generally well tolerated.

The present study has its limitations, as patients were allowed to take concomitant medication, which might have affected the efficacy of the study drugs to some extent. And also bacterial culture and senstivity was not done. So study needs to be validated with randomised double blind studies on a larger sample size.

The study recommends the use of Garenoxacin as an alternative to Moxifloxacin in acute exacerbation of COPD in patients.

Conclusion

5-day course of Garenoxacin is therapeutically comparable to Moxifloxacin in terms of clinical efficacy and safety in acute exacerbations of COPD.

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