Antidepressant activity of Ciprofloxacin and Levofloxacin by forced swim test in Swiss albino mice on chronic administration

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Abstract

Introduction: Depression is a neuropsychological disorder with its own course of illness which affects day to day life. Fluroquinolones has been shown some antidepressant like effect in our previous acute study.

Objectives: Antidepressant activity of Ciprofloxacin and Levofloxacin in Swiss albino mice on chronic administration.

Materials and Methods: Swiss albino mice were randomly divided in to six groups of which each weighing 20-25 gm and the groups are as follows, Group I: 1% Gum acacia, 10ml/kg served as control, Group II: Imipramine, 10mg/kg served as reference standarsd, Group III and IV, Ciprofloxacin 25 & 50 mg/kg respectively, Group V & VI, Levofloxacin, 25 & 50 mg respectively. Each mouse was administered with respective vehicle / drug one every day for 09 days, and one hour prior to experiment on 10th day. Each mouse was allowed to swim in a jar containing water making sure that its legs does not touch the bottom of the jar and it can swim by keeping its head just above the water surface. First two minute reading was not recorded but last four minutes activity was noted for mobility and immobility. Increase in the duration of mobility time and lesser the immobility time was considered that test drug is having antidepressant effect.

Results and Discussion: Mean duration of immobility in Forced swim test in control group was 195.83 ± 2.31 sec, Imipramine (standard) is 147.5 ± 1.87 sec, for group III & IV pretreated with Ciprofloxacin 25mg/kg is 146 ± 3.57 sec and 50mg/kg is 175.5 ± 3.39 sec respectively, while group V & VI pretreated with Levofloxacin 25mg/kg & 50 mg/kg is 167 ± 2.60 and 185.16 ± 3.06 sec respectively. The p value for the both the test drugs in all the doses was <0.01, thus showing its significant comparable to Imipramine, the standard.

Conclusion: Both Ciprofloxacin and Levofloxacin have shown significant antidepressant activity at the dose of 25 and 50 mg/kg respectively by forced swim test in Swiss albino mice on chronic administeration.

Keywords: Antidepressant effect, Ciprofloxacin, Forced swim test, Levofloxacin, Chronic administration.

Introduction

Several millions of people are suffering from depression all over the world which is a severe mood disorder. Even, World Health Organization (WHO) accepts this fact that, and it considers that depression is the 4th leading cause of disability across the globe apart from perinatal conditions, lower respiratory infections (LRTIs) and HIV/AIDS.[1] About two third of depressed patients in the world approximately will have suicidal thoughts and on an average about 10-15% will attempt for it also based on statistics.[2] Biochemically and functionally, a decrease in the levels of the monoamine neurotransmitter nor adrenaline, 5-hydroxytryptamine and also dopamine is attributed for the symptoms of depression.[3] Antidepressant activity will be shown by the drugs that increase selectively or non-selectively these monoamines level in synaptic cleft at their respective neurons.[4] Many of the currently available antidepressants have significant antidepressant activity, but they are not devoid of side / adverse effects and they show relatively low response.[5] Based on previous studies, only two out of three patients on an average will respond to conventional antidepressants and one among them one patient would have probably responded to placebo as well.[6] So based on these factors, as their there are search for new antidepressant drugs with promising results, the following studies has been taken where our previous study to evaluate acute antidepressant activity of fluoroquinolones (Ciprofloxacin & Levofloxacin) has shown promising results in forced swim test in Swiss albino mice in comparison to Imipramine.

Materials and Methods

Permission was obtained from institution ethic committee from A.J. Institute of Medical Sciences & Research centre, Mangalore, Karnataka, India. Swiss albino mice were randomly divided in to six groups of which each weighing 20-25 gm and the groups are as follows, Group I: 1% Gum acacia, 10ml/kg served as control, Group II: Imipramine, 10mg/kg served as reference standarsd, Group III and IV, Ciprofloxacin 25 & 50 mg/kg respectively, Group V & VI, Levofloxacin, 25 & 50 mg respectively. Each mouse was administered with respective vehicle / drug one every day for 09 days, and one hour prior to experiment on 10th day. Each mouse was allowed to swim in a jar containing water making sure that its legs does not touch the bottom of the jar and it can swim by keeping its head just above the water surface. First two minute reading was not recorded but last four minutes activity was noted for mobility and immobility. Increase in the duration of mobility time and lesser the immobility time was considered as that test drug to be having antidepressant effect.

Results and Discussion

Duration of immobility (mean±SD) in Forced swim test in control group is was 195.83 ± 2.31 sec, Imipramine (standard) is 147.5 ± 1.87 sec, for group III & IV pretreated with Ciprofloxacin 25mg/kg is 146 ± 3.57 sec and 50mg/kg is 175.5 ± 3.39 sec respectively, while group V & VI pretreated with Levofloxacin 25mg/kg & 50 mg/kg is 167 ± 2.60 and 185.16 ± 3.06 sec respectively. The p value for the both the test drugs in all the doses was <0.01, thus showing its significant comparable to Imipramine, the standard. The differences in the mobility and immobility period among different groups are shown in Table 1. This substantiates our previous acute study for the antidepressant activity of Ciprofloxacin and Levofloxacin as a potent and efficacious antidepressant agent. However further studies are needed to know its molecular mechanism of action.

Table 1: Duration of immobility on Chronic administration of Ciprofloxacin and Levofloxacin by forced swim test in Swiss albino mice.

Groups	Treatment (dose in mg/kg)	Duration immobility in seconds (Mean ± SD)
1	Control (1 % Gum acacia), 10ml/kg	195.83 ± 2.31
2	Standard (Imipramine, 10mg/kg)	147.5 ± 1.87***
3	Ciprofloxacin (25mg/kg)	146 ± 3.57***
4	Ciprofloxacin (50mg/kg)	175.5 ± 3.39***
5	Levofloxacin (25mg/kg)	167 ± 2.608***
6	Levofloxacin (50mg/kg)	185.16 ± 3.06***
Observations are mean ± SD, One way ANOVA followed by Dunnet's multiple comparison test.*p>0.01-Not Significant, *p<0.05-Significant, *p<0.01-Highly significant		

Conclusion

In our study, fluoroquinolones like Ciprofloxacin and Levofloxacin have shown significant antidepressant activity at the dose of 25 and 50 mg/kg respectively by forced swim test in Swiss albino mice comparable to Imipramine, However further researches are needed to support this research in larger samples and in different models and possibly by using different standards also to differentiate its possible mechanism of action. We claim from this study as a unique study due to an antimicrobial drug showing an antidepressant with the support of our previous acute study of the same drugs for its antidepressant activity.

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