ORIGINAL RESEARCH PAPER
VOLUME-6 | ISSUE-6 | JUNE-2017 | ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

Evaluation of Analgesic Activity of Venlafaxine in Swiss Albino Mice

Pharmacology

Mohamed Gani A — Associate Professor, Department of Pharmacology, Government Vellore Medical College, Vellore, Tamil Nadu.

Ganesh V — Assistant Professor, Department of Pharmacology, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Kanyakumari (Dist), Tamil Nadu.

Sandeep V — Assistant Professor, Department of Pharmacology, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Kanyakumari (Dist), Tamil Nadu.

Sarath Babu K — Assistant Professor, Department of Pharmacology, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Kanyakumari (Dist), Tamil Nadu.

ABSTRACT

Pain can develop due to various stimuli. Analgesics are the drugs used to reduce the pain in various disorders. Analgesic activity of Venlafaxine was screened in the present study. Swiss Albino mice were used in the study. Tail clip and flick models were used to screen analgesic effect of Venlafaxine. Mice pretreated with Aspirin and Venlafaxine showed significant analgesic effect compared to control group. Venlafaxine showed lesser analgesic effect compared to Aspirin. In conclusion Venlafaxine showed significant analgesic effect in both models. Further studies are required to screen analgesic effect of Venlafaxine in different models and animals.

KEYWORDS:

Aspirin, Analgesic, Reaction Time, Tail Clip, Tail Flick, Venlafaxine

Introduction

Pain is the common symptom in various disorders. International association for the study of pain defines pain as an "unpleasant sensory and emotional experience with actual or potential tissue damage" [1]. Every individual experiences pain in one or various forms in their life time. Pain is generated due to the production of prostaglandins (PGs) [2, 3]. Thus analgesics drugs act by blocking the production of prostaglandins by inhibiting COX enzyme inside the body [4]. Wide range of analgesic drugs are used ranging from standard drugs like aspirin, ibuprofen, diclofenac to newer drugs like valdecoxib, celecoxib to reduce the pain [5]. Each drug has its own disadvantages ranging from gastric ulceration, cardiac toxicities, blood dyscrasias and renal toxicities. Search for new analgesics agents having better efficacy with minimal adverse effects are continuing throughout the world [6]. Venlafaxine is a novel anti-depressant drug studied extensively and found to have analgesic effect [7, 8]. It is administered for very painful neuropathic conditions like bony metastatic cancers. Venlafaxine is a serotonin and norepinephrine reuptake inhibitor (SNRI) [9]. It blocks neuronal reuptake of serotonin and norepineprine. With this background the present study has been done to evaluate analgesic effect of Venlafaxine for its role in reducing painful conditions apart from its antidepressant property in Albino mice.

Materials and Methods

Study settings

The study was conducted in Department of Pharmacology, Madurai Medical College, Madurai, Tamil Nadu in the year of 2007. This study was ethically cleared from Institutional Animal Ethics Committee.

Procedure

Evaluation of analgesic activity by Tail Clip Method

Animals

Albino mice weighing 25-30 gm were obtained from Central Animal House, Madurai Medical College, Madurai, Tamil Nadu. They were fed on standard mice pellet diet and water provided in feeding bottle. All the animals were maintained under standard laboratory conditions temp 240C and humidity 60-70% [10].

Study design

Total 18 mice were divided in to three groups each of 6 mice.

Group-I: Control (Distilled water)
Group-II: Standard (Aspirin 100mg/kg)
Group-III: Test (Venlafaxine 30 mg/kg)

Procedure

After sixty minutes of drug administration, the tail clip was applied to the base of the mouse's tail for one minute. The reaction time (1st attempt by the mouse to remove the clip) was observed. This procedure made sure that all the animals responded to the physical stimuli. An animal which does not respond to the physical stimuli was replaced. Reaction time was noted and analyzed [11].

Evaluation of analgesic activity by Tail flick Method

Study design

Total 18 mice were divided in to three groups each of 6 mice.

Group-I: Control (Distilled water)
Group-II: Standard (Aspirin 100mg/kg)
Group-III: Test (Venlafaine 30 mg/kg)

Procedure

After sixty minutes of drug administration, reaction time (tail flick response) was noted for all the mice. Not more than 10 seconds was allowed to avoid any injury to the tail of the mice [12].

Statistical analysis

The data was expressed in Mean ±SD. SPSS (Statistical Package for Social Sciences 16.0 version). ANOVA (Post hoc) followed by Dunnet t test applied to find statistical significant between the groups. p value less than 0.05 ($p<0.05$) considered statistically significant at 95% confidence interval [13].

Results

Evaluation of analgesic activity by Tail Clip Method

The reaction time for the control group was 3.67+0.58 Sec and has no analgesic effect. The reaction time for the standard group (aspirin) was 11.67+1.53Sec. The reaction time for the test group (venlafaxine) was 7.67+0.58 seconds. Group-II and III showed significant ($p<0.01$) increase in reaction time compared to Group-I. Aspirin showed significant $p<0.01$) analgesic effect compared to venlafaxine group.

Evaluation of analgesic activity by Tail flick Method

The reaction time for the control group was 2.33+0.58 seconds and has no analgesic effect. Significant ($p<0.05$) increase in reaction time was observed in Aspirin (7.00+1.00) Sec and Venlafaxine (6.33+0.58) Sec compared to control group.

Discussion

Pain is the most common symptom experienced by the mankind. There are different kinds of pain like musculoskeletal pain, colicky pain, visceral pain, central pain and neuropathic pain [14]. Hence pain forms an important tool in diagnosing a disorder of internal organs of the human body. Referred pain is very important tool in diagnosing an affected organ in the body (Eg. appendicular pain) [15]. In the present study, the analgesic effect of venlafaxine was studied by tail clip and tail flick methods. The analgesic effect is compared with standard drug aspirin. The main mechanism of action of venlafaxine as an antidepressant is by the inhibition of serotonin and norepinephrine reuptake. Serotonin and norepinephrine are the neurotransmitters in diffused noxious inhibitory control probably at both spinal and supra spinal level. Reuptake inhibition will enhance/prolong the effect of released biogenic amines. This might be the possible mechanism of action of venlafaxine as an analgesic.

Conclusion

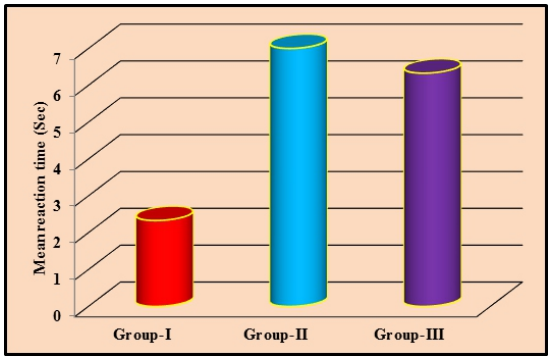
Pretreatment with Venlafaxine produced analgesic activity in both models. Further studies required to find the analgesic dose of Venlafaxine to treat various pain disorders.

Table-1: Evaluation of analgesic activity of Venlafaxine in Tail Clip Method

Groups	Treatment	Reaction Time (Sec) (MEAN±SD)
Group-I (Control)	Distilled water	3.67±0.58
Group-II (Standard)	Aspirin (100 mg/kg)	11.67±1.53*
Group-III (Test)	Venlafaine (30 mg/kg)	7.67±0.58*,#

(*p<0.05 significant compared Group-I with other groups, #p<0.05 significant compared Group-II with other groups)

Graph-1: Evaluation of analgesic activity of Venlafaxine in Tail Flick Method



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