COMPARATIVE ANALYSIS OF DRUG-INDUCED PARKINSONISM LIKE BEHAVIORS: THE STUDY OF RODENT SPECIES EFFECT USING A FORCE PLATE ACTIMETER

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ABSTRACT

Parkinson's disease (PD) is a progressive neurodegenerative disorder that mainly affects the motor ability of body. Various agents have been used to study PD for *in vivo* model with the hope to enlighten the pathogenesis and treatment strategies of the disease. The aim of this study is to quantitatively analyse the Parkinsonism characteristics induced by MPTP, tacrine, and rotenone in rodents (mice and rats) and compare their behaviors. 15 and 30mg/kg MPTP were administered intraperitonealy to induce typical motor parkinsonism features such as tremor, rigidity and bradykinesia in mice whereas 2.5 mg/kg rotenone was injected subcutaneously to produce the same behavior in rats. Involuntary lateral movement of jaw is another symptom exhibited by the patients of PD. 5mg/kg tacrine was administered intraperitonealy to both mice and rats to induce lateral movement of jaws. Rodents were kept inside force plate actimeter (FPA) for behavioral quantification after neurotoxin induction. FPA is a modern technological device used to study neurological behaviors of small animals under the influence of toxins inducing neurological problems. All of the neurotoxins used in this study (MPTP, tacrine, and rotenone) significantly induced bradykinesia and reduced locomotion in both mice and rats, as compared with control group. Oral treatment of rodents with 10mg/kg Sinemet® (levodopa: carbidopa 4:1) improved their motor ability. Power spectra analysis revealed that in mice MPTP induced tremor and rigidity at frequency of 7-12 Hz and rotenone produced the same behavior at the frequency of 0.5-2 Hz and 4-12 Hz. Intraperitoneal administration of tacrine to mice generated one significant peak at 10-12Hz while the peak in rats was at 0.5-3 Hz. Oral administration of 10mg/kg Sinemet® lowered power intensity of neurotoxin-induced force peaks, indicating the antagonistic effect of Sinemet® in neurotoxin-induced Parkinsonian symptoms. This model is possibly useful to study anti-parkinsonian potency of newly discovered drugs.

KEY WORDS: PARKINSON'S DISEASE / MPTP / TACRINE / ROTENONE / FPA

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