

The Effect Of Viola On Monoaminoxidase (MAO) And Acetylcholine Esterase(Ache) In vivo And In vitro

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Abstract— This study was designed to show the effects of alcoholic extract of viola on Monoaminoxidase (MAO) and Acetylcholine esterase(AChE) in mice brain and in human serum(healthy). the results showed that ethyl extract of this plant inhibit these two enzymes in vivo and in vitro. Also kinetic study was done for these enzyme which showed non competitive inhibition and un-competitive with MAO and AChE respectively.

Keywords— Viola, Monoamine oxidase, Acetylcholine esterase

INTRODUCTION

Viola (violaceae) commonly called sweet violet or banafsheh[1]. Chemically viola contains saponins, flavonoids, tannins, and phenolic compounds [2,3]. Traditionally, viola has been used as anti-inflammatory[4], antioxidant [5], antipyretic[6], analgesic [7], antibacterial[4] and anticancer[8]. Furthermore, viola could be used in treatment of anxiety, hypertension, and antispasmodic[9].

AChE (EC.3.1.1.7) is a membrane bound enzyme found in excitable tissues such as synaptic junctions [10]. The role of AChE is the extinction nerve impulse by neurotransmitter hydrolysis [11]. There are some diseases that cause a decrease in AChE activity such as liver disease[12], kidney disease[13], heart disease [14], and cancer[15]. Also there are diseases cause increase in AChE activity such as schizophrenia[16], and nephritic syndrome diseases[17].

MAO (EC .1.4.3.4) is a metabolic vital enzyme the principle role of it is oxidation of amines to give H₂O₂. MAO is found in tissues in two form, MAO -A and MAO- B.[18].

The main role of MAO-A is the oxidation of serotonin, while the principle action of MAO-B is the oxidation of benzylamine[19].

Materials and methods:

50 gm *viola* powder mix with 500ml ethanol with stirrer for 48 hour, the filter was taken, allow to this filter to dry at temperature 40 C the product represent crud alcoholic extract of viola.

In vivo study:

Swiss albino mice of male weight about 20-25 gm were used. mice obtained from drug control center. the animals were kept in animal house of almustansiryah university, college of science, biology department. mice were separated into 3 groups, six animals for each group.

Group 1: control

Group 2: 200mg alc. extract of viola/ 1kg for mouse weight

Group 3: 400mg alc. Extract of viola/ 1kg for mouse weight

After completing the last day mice sacrificed by cervical dislocation, and collect the brain samples. samples of mice brain were prepared following the procedure of Schurr and Livne [20].

After complete preparation of mice brain samples, MAO activity was detected by using procedure in [21] and AChE detected by method [22].

In vitro study:

MAO activity was assayed in human serum of healthy subject by method in [21], and AChE measured by using method in [22].

Results and discussion:

Medicinal plants have an essential role in providing health and treatment diseases in human [23]. so it careful to assess the efficacy of herbal used by indigenous practitioners. [24]

In in vivo study the ethanolic extraction of viola (200 and 400mg/kg) administered to mice for 14 following days, the results for this study show significantly decrease in the brain MAO and AChE, as shown in table(1) and(2).

In in vitro study, different concentration of viola (0.1, 0.05, 0.02, 0.001 mg/100ml) prepared to show the effect of this extract on the activity of MAO and AChE in healthy human serum. the result obtained showed that viola extract inhibit activity of these enzyme and the percent of inhibition increase with increasing the extract concentration, As in table(3) (4) and figure (2).

The kinetic properties of these extract K_{map}, V_{map}, K_i were also determined as shown in figure(1).

Viola extract contain tannins which have the ability to decrease the action of MAO and can interfere in the action of neurotransmitter in the brain [25]. In addition, compounds such as linoleic acid and carnosic acid are present in the extract of *viola* [3], and these compounds are able to bind to acetylcholine. Moreover, they contain an inhibitory effect on AchE activity and thus are able to improve cognitive functions [5]. Flavonoids compounds in the plant preserve catecholamine by inhibiting MAO.

Table(1): effect of different concentrations of alcoholic extract of *viola* on MAO in mice brain

Number of mice	Oral dose(mg/kg) 14days	MAO activity(U/g) Mean ±SD
6	control	96±11
6	200	78±8*
6	400	51±7.9*

*p < 0.001:significance difference

Table(2): effect of different concentrations of alcoholic extract of *viola* on AchE in mice brain

Number of mice	Oral dose(mg/kg) 14days	AchE activity(μmole/g) Mean ±SD
6	control	130±8.7
6	200	90±9*
6	400	55±9.3*

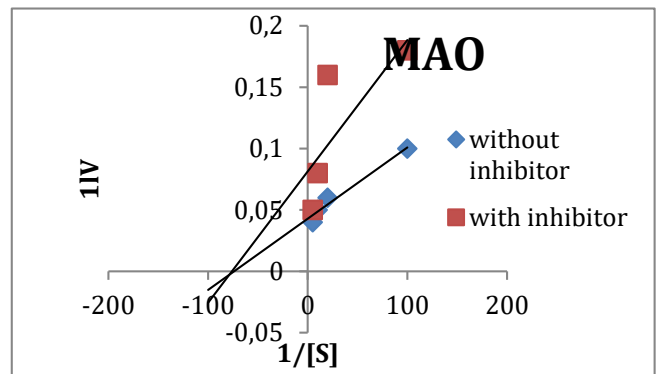
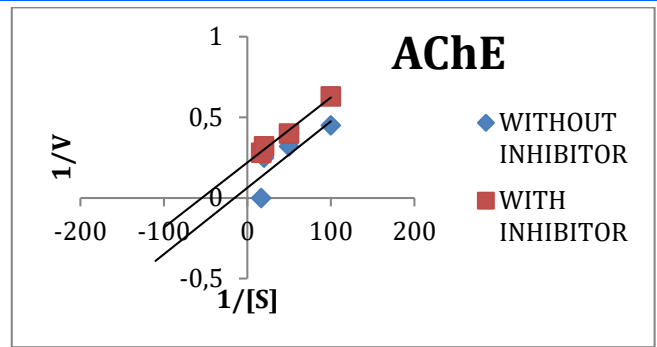
*p < 0.001:significance difference

Table(3):Effect of different concentrations of *viola* on MAO healthy human sera

Inhibitor conc.(mg/dL)	Enzyme activity (μmol/3min/ml)	% Inhibition
NIL	27.31	
0.001	21.63	20.79
0.02	17.04	37.6
0.05	9.16	66.46
0.1	5.32	80.52

Table(4):Effect of different concentrations of *viola* on AchE healthy human sera

Inhibitor conc.(mg/dL)	Enzyme activity (μmol/ml)	% Inhibition
NIL	5.96	
0.001	5.33	10.6
0.02	4.72	20.8
0.05	3.86	35.2
0.1	2.10	64.8



Figure(1):Line Weaver-Burk design for *viola* with MAO and AchE.

Table (5): Kinetic parameters of MAO, and AchE with of *viola* in human sera

	V max	K m	Inhibition kind
MAO	25	0.013	Non-competitive
AchE	16.6	0.055	Un-competitive

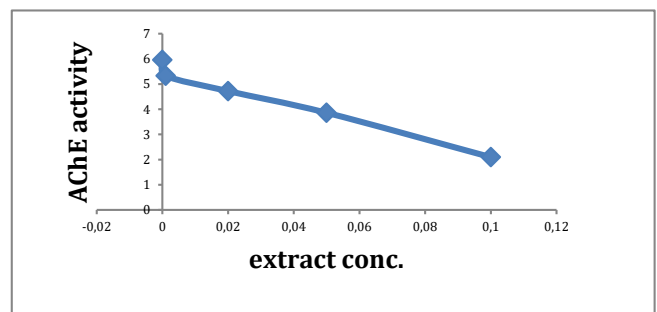
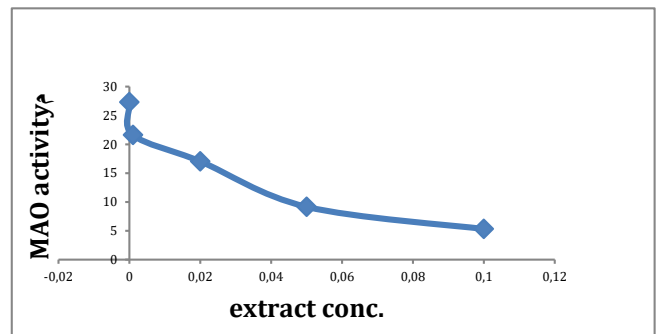


Figure (2): Study the changes of MAO and AchE in human sera with varies conc. of *viola*

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