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SCREENING OF SOME TURKISH MEDICINAL PLANTS FOR THEIR ANALGESIC ACTIVITY

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ABSTRACT

Nine crude extracts of various parts of eight medicinal plants from different regions of Turkey were evaluated for their analgesic activities by tail flick method in mice. The analgesic activities of these extracts were compared with acetylsalicylic acid (300 mg/kg) which is used as a standard drug. Extracts were given orally in doses of 300, 500 and 1000 mg/kg. 0.9% saline was also administered in control group of animals.

Results showed that four extracts were having highly significant analgesic activity at all the three doses tested. Three showed significant effects at higher doses while two extracts did not show any significant results.

Introduction

Analgesic drugs which are currently in use are either narcotics or non-narcotics which have proven side and toxic effects. To develop new synthetic compounds in this category is an expensive venture and again may have problems of side effects. On the contrary, many medicines of plant origin had been used and are in use successfully since long time without any serious effects (Ikram, 1983).

The lack of potent analgesic drugs now actually in use prompted this study in which some Turkish medicinal plants for their analgesic activities were screened (Ahmed *et al,* 1993). Previously, similar attempts were made to evaluate the analgesic and anti-inflammatory properties of some Pakistani medicinal plants (Ahmad, 1992; Ahmad *et al,* 1992).

Continuing our screening studies for analgesic effect of some Turkish medicinal plants, the results of eight medicinal plants are given in this paper.

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Materials and Methods

Plant materials

Plants (Table 1) which have been evaluated in this study were collected from various parts of Turkey. The voucher specimens of these plants are kept in the Her-barium of Faculty of Pharmacy, Gazi University, Ankara.

Extraction

5 g dried and powdered plant materials were extracted with ethanol at room temperature by maceration. The ethanolic extracts were concentrated to dryness in vacuo. These extracts were used for the determination of analgesic activity using tail immersion method in mice.

Preparation of samples for bioassay

Acetylsalicylic acid in a quantity of 300 mg and extracts of these plants were homogenized in 1.5% aqueous suspension of gum tragacanth in 300, 500 and 1000 mg quantity. The homogenate including the insoluble fraction was administered orally to animals on the basis of the body weight (mg/kg).

Drugs

All the drugs used in this study were of pharmaceutical grade. Acetylsalicylic acid was supplied by Aspro Nicholas (Pakistan) Ltd.

Animals

Albino mice of either sex for analgesic studies were used in the present study. Weight of mice ranged from 20-25 g. All animals were maintained in groups of five at 22±1.°C with light/dark cycle of 12:12 hours. They were starved overnight but allowed fresh water before administration of the plant extracts.

PROCEDURE FOR TESTING ANALGESIC ACTIVITY

Tail immersion method

In the present study analgesia was assessed according to the method reported by Di Stasi *et al* (1988). Mice divided in the groups of five each, were held in position in a suitable restrainer with the tail extending out. 4-5 cm area of the tail was marked and immersed in the water bath thermostatically maintained at 51°C. The withdrawal time of the tail from hot water (in seconds) was noted as the

reaction time or tail flick latency. The maximum cut off time for immersion was 180 seconds to avoid the injury of the tissues of tail. 0.2 ml of 0.9% NaCl solution was administered to control animals, plant extracts in doses of 300, 500 and 1000 mg/kg were given orally by incubation. The initial reading was taken immediately before administration of test and standard (acetyl-salicylic acid 300 mg/kg) drugs and then 60, 90, 150, 180 and 210 minutes after the ad-ministration.

The criterion for analgesia was postdrug latency which was greater than two times the predrug average latency (Janssen *et al*, 1963). Tail flick latency difference or mean increase in latency after drug administration was used to indicate the analgesia produced by test and standard drugs. Analgesia TFLD was calculated as follows.

Analgesia TFLD = postdrug tail flick latency - predrug tail flick latency

Statistical analysis

Values for analgesic activity were expressed as "mean increase in latency after drug administration ± S.E.M. in terms of seconds". The significance of difference between means was determined by student's t-test. All statistical values *were* performed according to the method given by Alcaraz and Jimenez (1989).

Results and Discussion

Some Turkish medicinal plants are screened for their analgesic activities and the results of 9 extracts prepared from eight of these plants are given in Table 2.

The results of analgesic activities of plant extracts are indicated as "Analgesia TFLD" (tailflick latency difference) or "Mean increase in latency after drug ad-ministration" ±S.E.M. in terms of second(s). Our findings showed that the plants possessed varying degrees of analgesic activity of various doses.

Acetylsalicylic acid was used as standard drug in this study since it is the prototype against the other analgesic, anti-inflammatory and anti-pyretic drugs compared. Acetylsalicylic acid is widely regarded as a drug of choice among the available non-steroidal analgesic and anti-inflammatory drugs (Macleod, 1984).

Bunts longifolia (Aerial)

The results, with regard to the analgesic activity of the ethanolic extract showed a highly significant ($P<0.01$) effects at all the three doses tested in mouse tail immersion method. The potency of the effects was increased with the increase

in dose of the drug i.e., dose- dependent manner. The analgesic effects of this plant extract were quite comparable or even better at the doses of 500 and 100 mg/kg than acetylsalicylic acid (standard drug) in terms of Analgesia TFLD. The onset and duration of action is much better than standard drug.

Buxus sempervirens (Aerial)

The extract of aerial parts of *Bums sempervirens* showed varying degree of analgesic effects in this study. The analgesic effects at 300 rng/kg dose were less potent, while at 500 and 1000 mg/kg doses the extract was moderately significant.

Burns sempervirens (Roots)

In this study ethanolic extract of the roots of *Buxus sempervirens,* was when studied for its analgesic activity in intact mouse tail immersion method, showed highly significant analgesic effects in dose-dependent manner. Even though the drug has a quick onset of action but has less potent analgesic effects, even at 1000 mg/kg dose level, when compared with that of standard drug in this study.

Fumaira vaillantii (Aerial)

Fumaria vaillamii is another very promising Turkish medicinal plant which showed highly significant analgesic effects in this study. Again the results were in dose-dependent manner. The extract of this plant was found to be better than the standard drug, as at higher doses the extract has a rapid onset of action and longer duration of action, the two factors which determine the efficacy of a drug Thus, the plant has good biological value, as far as the analgesic activity is concerned.

Rheum vibes (Roots)

At the doses of 300, 500 and 1000 mg/kg the ethanolic extract of this plant was found to possess no analgesic activity in terms of "Mean increase in latency" or "Analgesia TFLD" when tested on intact mice by tail immersion method.

Rumex crispus (Aerial)

The analgesic effects of ethanolic extract of aerial parts of Rumex crispus and acetylsalicylic acid (as standard drug) are summarized in Table 2. The plant extract showed highly significant analgesic activity at all the three doses tested 300, 500 and 1000 mg/kg. The extract showed a rapid onset of analgesic effect as compared to that of standard drug but the analgesic activity remained less potent when compared with standard drug throughout the whole study.

Taros baccata (Aerial)

This plant extract was also found to be inactive, in terms of "Analgesia TFLD", at any dose level tested in this study.

Tussilagofarfara (Aerial)

The plant extract showed statistically significant but less potent analgesic effects at 300 mg/kg, but at other dose levels (i.e., 500 and 1000 mg/kg) the plant extract showed significant analgesic effects upto +90 minutes, but after that time period, the drug failed to exert any significant analgesic activity.

Urtica dioica (Aerial)

The extract of the aerial parts *of Urtica dioica* showed significant analgesic effects only at the dose level of 1000 mg/kg, otherwise the extract failed to exhibit any analgesic activity at any other dose level.

Conclusion

Screening of 9 extracts from eight plants showed interesting results with four highly significant, three with moderate significance and two without any analgesic activity. It seems that this screening may lead to some useful clinical worth, if some of these ex-tracts may further be thoroughly investigated using bioassay-guided fractionation for their mode of action, toxicity and other pharmacological effects.

As far as toxicity is concerned these extract showed no ill effects in animals upto 1000 mg/kg body weight.

Table 1
Medicinal plants and their parts used for extraction

Plant name	Part	Family	Location
Buxus longifolia	Aerial	Buxaceae	Rize-Camlihemsin
Buxus sempervirens	Aerial	Buxaceae	Rize-Camlihemsin
Buxus sempervirens	Roots	Buxaceae	Rize-Camlihemsin
Fumaria vaillantii	Aerial	Fumarioideae	Ankara-Lalahan
Rheum ribes	Roots	Polygonaceae	Kars
Rumex crispus	Aerial	Rubiaceae	Sivas-Zara
Taxus baccata	Aerial	Taxaceae	Rize-Camlihemsin
Tussilago farfara	Aerial	Compositae	Bolu
Utrica dioica	Aerial	Urticaceae	Rize-Camlihemsin

Table 2
Analgesic effects of plant extracts in mouse tail immersion method

Treatment	Dose/kg orally	Analgesia TFLD + S.E.M.(S)				
		+60	+90	+120	+150	+180 minutes
Control (Saline)	0.2 ml	0.06æ0.17	0.38±0.31	0.33±0.29	0.50±0.21	0.37±0.28
Buxus sem-	300 mg	1.00±0.16**	0.60±0.33	1.20±0.34	1.10±0.19*	2.30±0.60**
pervirens	500 mg	1.30±0.30**	2.00±0.65*	2.58±0.62**	3.40±0.64**	3.50±0.88**
(Aerial)	1000 mg	2.40±0.69**	2.70±0.92*	2.70±0.92*	3.30±0.97*	3.30±0.87**
Buxus	300 mg	1.20±0.20**	1.40±0.24*	2.10±0.24**	2.20±0.20**	2.40±0.24**
longifolia	500 mg	1.80±0.30**	1.30±0.30*	2.80±0.73**	4.80±0.91**	4.40±0.40**
(Aerial)	1000 mg	1.80±0.37**	2.40±0.50**	3.20±0.37**	4.80±0.80**	5.20±1.15**
Buxus sem-	300 mg	1.00±0.27**	2.10±0.24**	2.30±0.20**	4.20±0.65**	2.60±0.37**
pervirens	500 mg	1.30±0.54*	2.10±0.76*	1.90-0.60*	2.20±0.51**	3.10±0.84
(Roots)	1000 mg	1.90±0.18**	2.60±0.29**	2.50±0.32**	2.50±0.35**	2.80±0.25**

Table continue . . .

Treatment	Dose/kg orally	Analgesia TFLD + S.E.M.(S)				
		+60	+90	+120	+150	+180 minutes
Fumaria	300 mg	0.60±0.19*	1.50±0.32*	1.60±0.37*	1.80±0.26**	2.00±0.35**
vaillantii	500 mg	0.90±0.30**	2.30±0.44**	2.30±0.41**	3.50±0.32**	3.70±0.49*
(Aerial)	1000 mg	1.20±0.34**	2.90±0.25**	4.30±0.37**	4.60±0.40**	4.80±0.37**
Rheum	300 mg	0.30±0.12	0.20±0.12	0.40±0.33	0.80±0.30	0.90±0.29
ribes	500 mg	0.20±0.12	0.30±0.20	1.00±0.27	1.30±0.20*	1.10±0.33
(Roots)	1000 mg	0.50±0.15*	0.50±0.15	0.90±0.36**	1.10±0.43	1.10±0.18*
Rumex	300 mg	1.40±0.46*	1.60±0.33*	2.10±0.29**	2.70±0.20**	2.70±0.41**
crispus	500 mg	1.80±0.41**	2.00±0.35**	1.90±0.19**	2.10±0.29**	2.40±0.40**
(Aerial)	1000 mg	1.70±0.12**	1.50±0.16**	1.80±0.12**	2.00±0.22**	3.00±0.47**
Taxus	300 mg	0.14±0.09	0.70±0.30	0.33±0.10	0.50±0.16	0.30±0.10
baccata	500 mg	0.40±0.40	0.37±0.20	0.30±0.15	0.67±0.15	0.80±0.21
(Aerial)	1000 mg	0.10±0.23	0.17±0.20	0.83±0.40	0.47±0.20	0.60±0.20
Tussilago	300 mg	1.30±0.30**	1.50±0.25*	1.60±0.43*	1.60±0.37*	1.50±0.22**
farfara	500 mg	2.60±0.51**	2.80±0.37**	1.00-0.32	1.50±0.45*	1.20±0.37
(Aerial)	1000 mg	1.40±0.24**	1.40±0.24*	1.20±0.37*	0.60±0.80	0.60±0.40
Urtica	300 mg	0.60±0.18*	0.70±0.30	0.30±0.12	0.30±0.12	0.40±0.24
dioica	500 mg	0.90±0.10*	1.10±0.29	1.10±0.33	0.80±0.25	1.00±0.00*
(Aerial)	1000 mg	1.00±0.35*	1.50±0.44*	1.50±0.22**	1.60±0.43*	1.90±0.33**
Acetylsali-cylic acid	300 mg	0.90±0.15**	2.22±0.19**	2.31±0.14**	3.48±0.14**	3.84±0.20**

Significant relative to control = **P<0.01, *P<0.05 (N=5).

Table 3
Summary of analgesic effects of some turkish medicinal plants

Name of plants	Dose mg/kg		
	300	500	1000
Buxus sempervirens (Aerial)	+ +	+ + +	+ +
Buxus longifolia (Aerial)	+ + +	+ + +	+ + +
Buxus sempervirens (Roots)	+ + +	+ +	+ + +
Fumaria vaillantii (Aerial)	+ +	+ +	+ + +
Rheum ribes (Roots)	N.A.	N.A.	N.A.
Rumex crispus (Aerial)	+ + +	+ + +	+ + +
Taxus baccata (Aerial)	N.A.	N.A.	N.A.
Tussilago farfara (Aerial)	+	+	+
Urtica dioica (Aerial)	N.A.	+	+ +

+ + + Highly significant
+ + Moderately significant
+ Significant
N.A. Not active.