Arch. Pharm. Res. 2 (2), 127~188 (1979)

Biological Evaluation of Korean Medicinal Plants(III)

Won Sick Woo, Eun Bang Lee and Byung Hoon Han

Natural Products Research Institute, Seoul National University, Seoul 110, Korea

(Received 6 October 1979)

Abstract□ The extracts of sixty Korean plants were evaluated for their biological activities such as antitumor activities against Sarcoma 180, Leukemia SN-36 and Ehrlich ascites carcinoma, antimicrobial activities and behavioral observation in mice. The results are tabulated.

Keywords□ Korean medicinal plants—antitumor activity; Sarcoma 180, Leukemia SN-36, Ehrlich carcinoma—antimicrobial activity—behavioral changes.

In this laboratory, more than one hundred and forty Korean plants were previously evaluated for biological activities[1,2]. In this successive report, sixty species which belong to 36 families were evaluated.

EXPERIMENTAL

Materials and Animals

Preparation of plant extracts and the animals used were the same as in the previous report[2]. The strains of microbes selected for the antimicrobial activity were *Streptococcus faecalis, Streptococcus aureus, Escherichia coli, Bacillus subtilis* and *Candida albicans.* These strains were kindly supplied by National Institute of Health, Korea.

Methods

The evaluation of acute toxicity, antitumor activity, antimicrobial activity and general behavioral observations were measured as in the previous report[2].

RESULTS AND DISCUSSION

The results of biological evaluation are shown in Table I. Most of the extracts appeared to be inactive against the ascites tumors employed, though some of the samples were active in one of the tumor models in the first screening procedure. In antimicrobial activity test, twenty-nine plant extracts among 54 samples were shown to be active in at least one among the five strains. *Echinops latifolius* was active only against the Gram positive microbes, whereas *Biota orientalis, Gentiana scabra* and *Piper longum* were active against the Gram negative microbes. Ten samples showed activity in the Gram positive and negative microbes. In this test, it was observed that the whitish turbid rings were formed around the disks contained the extracts of *Rhus javanica* and *Geranium* sibiricum. This might be ascribed to the precipitates which were formed due to tannins contained in the extracts.

With mouse behavioral studies, the extracts of *Nerium indicum, Piper longum* and *Uncaria rhynophylla* showed CNS depressant activity and *Lycoctonum pseudolaeve* var *erectum* showed CNS depressant with autonomic activity. On

Table I: Results of the biological evaluation of plant extracts

Plant name	Date collect.	Part[a] used	Antitumor activity[b] Dose (mg/kg, ip)	S-180 T/C (%)	SN-36 T/C (%)	Ehrlich T/C (%)	Antibacterial activity[d] I[e]	II[f]	III[g]	IV[h]	V[i]	Mouse behavior Activity	Dose range (mg/kg, ip)	Acute toxicity >mg/kg, ip
Anacardiaceae														
Rhus javanica	7/75	gall	100	100	94	118	16	16	12	14	—	SMd (w), Wr.	60– 100	125
Apocynaceae														
Nerium indicum	5/75	lf st	60	88	104	107	—	—	—	—	—	AG(w), Tr(w) BTd, Hp.	60 –100	125
Araliaceae														
Kalopanax pictum var. *typicum*	2/75	rt bk	500	132[c]	NT	92	8	8	8	—	—	SMd (w), Wr.	500 –800	1000
Aspidiaceae														
Dryopteris crassirhizoma	7/75	lf st	500	101	NT	103	14	14	10	12	—	SMd (w).	500 –800	1000
Berberidaceae														
Epimedium koreanum	7/75	ap	500	90	114	122	10	10	9	8	—	SMi (W), Wr.	500 –800	1000
Campanulaceae														
Adenophora remotiflora	5/75	rt	500	95	88	100	—	—	—	—	—	Wr.	500 –900	1000
Codonopsis pilosula	7/75	rt	500	NT	96	108	—	—	—	—	—	SMd (w).	500–1000	1000
Compositae														
Artemisia iwayomogi	8/27	ap	500	82	181[c]	114	NT	NT	NT	NT	NT	SMi (w), Wr.	500–1000	1000
Echinops latifolius	6/75	rt	500	88	99	98	12	10	—	9	—	SMd (w), Wr.	500–1000	1000
Echinops setifer	7/72	ap	500	130[c]	87	114	—	8	8	—	—	SMd (w).	500–1000	1000
Helianthus annus	8/74	lf	500	100	99	107	NT	NT	NT	NT	NT	Nil.	500 –800	1000
Synurus deltoides	7/72	ap	500	107	NT	112	—	—	—	—	—	SMi (w).	500–1000	1000
Cupressaceae														
Biota orientalis	8/69	sd	500	123	94	122	—	—	7	—	—	Nil.	500 –800	1000
Biota orientalis var. *stricta*	8/74	lf	500	100	124	92	12	14	8	12	—	SMd (w), Rd.	500–1000	1000
Cyatheaceae														
Cibotium barometz	2/75	rz	500	110	92	121	—	—	—	—	—	SMI (w), SR.	500–1000	1000
Ephedraceae														
Ephedra sinica	2/75	rt	500	92	100	120	—	—	—	—	—	SMi, Wr. SR.	500–1000	1000
Equisetaceae														
Equisetum arvense var. *boreale*	6/72	ap	500	85	109	87	7	—	—	7	—	SMi (w), Wr.	500–1000	1000
Flacourtiaceae														
Hydnocarpus sp.	2/75	sd	500	118	101	107	—	—	—	—	—	SMi (w), Wr.	500–1000	1000
Gentianaceae														
Gentiana scabra	2/75	rt	500	123	98	123	—	—	7	—	—	SMi (w), Wr.	500–1000	1000
Geraniaceae														
Geranicum sibiricum	7/75	ap	60	97	87	121	10	10	12	10	—	SMd (w).	100 –200	250

Gramineae													
Phyllostachys reticulata	7/2	ap	250	104	88	103	—	8	—	8	—	SMd (w).	250 -500 500
Labiatae													
Elscholtzia patrini	7/72	ap	500	113	99	109	—	8	8	—	—	SMd (w).	500 -800 1000
Elscholtzia splendeus	7/72	ap	500	85	99	88	8	—	—	8	—	SMd (w).	500 -800 1000
Leonurus sibiricus	5/75	ap	500	98	126[c)]	86	—	—	—	—	—	SMi (w), Wr.	500 -800 1000
Nepeta japonica	5/75	lf, st	500	106	124	90	—	—	—	—	—	SMi (w), Wr, SR.	500 -800 1000
Lauraceae													
Cinnamomum cassia	2/75	bk	125	103	82	98	—	8	10	—	—	SMi (w), Wr.	150 -500 1000
Leguminosae													
Glycyrrhiza urarensis	5/75	rt	500	96	91	90	10	12	12	10	—	Wr, SMd (w).	500-1000 1000
Liliaceae													
Veratrum japonicum	5/75	rz	250	118	80	75	—	8	8	—	—	SMi (w), SR.	500-1000 1000
Magnoliaceae													
Magnolia liliflora	8/73	lf	500	108	125[c)]	113	—	—	—	—	—	SMi (w), Wr.	500 -800 1000
Oleaceae													
Forsythia viridissima	5/75	fr	500	90	75	87	—	—	—	—	—	SMd (w), Wr.	500-1000 1000
Orchidaceae													
Bletilla striata	7/75	rz	250	93	NT	87	—	10	9	8	—	SMi (w), Wr.	250 -500 500
Dendrobium sp.	5/75	ap	500	103	100	94	—	—	—	—	—	SMi (w).	500-1000 1000
Paulowniaceae													
Paulownia tomentosa	7/73	lf	500	89	95	107	—	—	—	—	—	Wr.	300 -500 500
Piperaceae													
Piper longum	2/75	fr	500	82	115	123	—	—	7	—	—	SMd (w), AG, Hp.	300 -500 500
Polypodiaceae													
Pyrrhosia lingua	6/75	wp	500	94	96	107	7	—	—	7	—	Wr.	500-1000 1000
Ranunculaceae													
Lycoctonum pseudolaeve var. *erectum*	12/72	rt	15	90	79	100	—	—	—	—	—	SMd, AG, (w), Pp.	10 -15 15
Rosaceae													
Chaenomeles sinensis	2/75	fr	500	86	NT	102	14	10	10	—	—	Nil.	500-800 1000
Prunus ansu	2/75	sd	500	86	105	118	—	—	—	—	—	SMd (w).	500-1000 1000
Rubiaceae													
Rubia akane	12/72	rt	500	98	104	92	12	12	12	12	—	SMi (w).	500-1000 1000
Uncaria rhynchophylla	2/75	sp	500	126[c)]	96	92	—	—	—	—	—	SMd, Hp, BTd, Rd.	500-1000 1000
Rutaceae													
Citrus unshiu	2/75	pc	500	155[c)]	100	107	—	—	—	—	—	Wr.	500-1000 1000
Dictamus albus	2/75	rt bk	500	100	98	123	—	8	—	—	—	SMd (w).	500-1000 1000
Evodia rutaecarpa	2/75	fl	500	127[c)]	81	162[c)]	—	—	—	—	—	SMd (w).	500-1000 1000
Phellodendron amurense	10/72	bk	250	110	82	100	9	10	8	10	—	Wr.	250 -500 500
Poncirus trifoliata	11/74	fr	500	96	90	120	9	8	12	9	—	SMd (w).	500-1000 1000
Zanthoxylum schinifolium	7/75	fr	500	97	117	102	8	8	—	—	—	SMi, SR.	500-1000 1000

Sapindaceae														
Euphoria longana	2/75	fr	500	112	NT	119	—	—	—	—	—	SMd (w), Wr.	500–1000	1000
Saxifragaceae														
Saxifraga stolonifera	9/75	wp	500	88	NT	100	—	—	—	—	—	SMd (w), AG.	500–1000	1000
Scrophulariaceae														
Picrorrhiza kurroa	2/75	rz	250	94	NT	109	—	—	—	—	—	SMd (w).	500–1000	1000
Rehmannia glutinosa var. *purpurea*	2/75	rt	250	100	NT	136[c]	—	—	—	—	—	Nil.	500–1000	1000
Stemonaceae														
Stemona joponica	2/75	rt	250	111	103	112	—	—	—	—	—	SMd (w).	250–500	500
Ulmaceae														
Ulmus davidiana var. *japonia*	7/75	bk	500	85	84	107	NT	NT	NT	NT	NT	Wr.	500–1000	1000
Umbelliferae														
Angelica acutiloba	7/75	rt	500	104	98	105	—	—	—	—	—	SMd (w), Wr.	500–1000	1000
Angelica koreana	5/72	rt	500	160[c]	81	117	NT	NT	NT	NT	NT	SMd (w).	500–1000	1000
Angelica miqueliana	7/72	wp	500	115	101	93	NT	NT	NT	NT	NT	SMd (w).	500–1000	1000
Siler divaricata	2/75	rt	500	100	121	107	—	—	—	—	—	SMd (w).	500–1000	1000
Torilis japonica	2/75	fr	500	98	105	91	—	8	—	—	—	SMi (w), Wr.	500–1000	1000
Urticaceae														
Boehmeria paraspicata	7/72	ap	500	100	88	100	NT	NT	NT	NT	NT	SMi (w), Wr.	500–1000	1000
Zingiberaceae														
Curcuma aromatica	2/75	rz	500	123	NT	123	8	8	7	—	—	SMi (w), SR.	500–1000	1000
Zingiber officinale	7/75	rz	500	86	89	91	10	8	10	10	—	SMi (w), SR.	500–1000	1000

a) ap, aerial part; b, bark; fl, flower; fr, fruit; pc, pericarpium; rt, root; rz, rhizome; sd, seed; st, stalk; tb, tuber; wp, whole plant.

b) T/C, the mean survival time of the treated group over the mean survival time of the control group X 100.

c) Negative result after retest.

d) Number indicates the diameter (mm) of inhibited zone with 500 *ug*/disk of the sample; NT, not tested; —, no inhibition.

e) *Streptococcus faecalis.* f) *Streptococcus aureus.* g) *Escherichia coli.* h) *Bacillus subtilis.* i) *Candida albicans.*

j) AG, abnormal gait; BTd, decrease in body tone; Hp, hypothermia; Pp, palpebral ptosis; Rd, decrease in respiration rate; SMd (w), weak decrease in spontaneous movement;SMi, increase in spontaneous movement; SR, startle response; TR, tremor; Wr, writhing.

the other hand, the extracts which have shown CNS stimulant activity were *Ephedra sinica* and *Xanthoxylum schinifolium*. The other extracts showed only very weak depressant activities. Three samples among 60 showed no behavioral changes by the administration.

With respect to this biological evaluation, it is noted that there may exist some other activities in the components, for instance, volatile oils, which were not obtained during the preparation of the extracts.

ACKNOWLEDGMENT

The authors are grateful to Miss. H.J. Lee and Mr. T.B. Lee for their technical assistance.

LITERATURE CITED

1) Woo, W.S., Shin, K.H. and Kwon, Y.M., Biological evaluation of Korean medicinal plants. *J. Pharm. Soc. Korea* **16**, 121(1972).
2) Woo, W.S., Lee, E.B. and Chang, I.M., Biological evaluation of Korean medicinal plants. II. *Ibid.* **21**, 177(1977).