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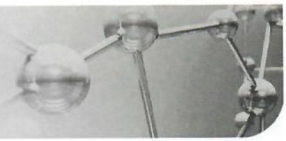

PNB-6

Differential Regulation of TLR Signaling Pathways by Andrographolide

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PNB-7

Phytochemical Investigation of *Ligularia Narynensis*

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PNB-8

Neuroprotective effect of hydrolysable tannins from *Terminalia chebula* against glutamate-induced apotosis in HT22 cells

Tuy An Trinh[1], Ji Hoon Song[1], Myoung-Sook Shin[1], Dahae Lee[2], Do Hwi Park[1], Ji Yun Baek[1], Ji Young Song[1], Gwi Seo Hwang[1], Noriko Yamabe[1], Ki Sung Kang[1*]

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PNB-9

EGCG derivatives show anti-metastatic activity in human breast cancer cells by controlling the expression of plasminogen activator inhibitor-1 and urokinase plasminogen activator

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PNB-10

(-)-Epigallocatechin (EGC) inhibits formation of advanced glycation end product (AGE) by trapping methylglyoxal (MGO)

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PNB-11

Epigallocatechin Gallate (EGCG) derivatives enhances autophagy in human hepatocellular carcinoma cell

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PNB-12

Anti-inflammation Activity Extracts from *Saururus chinensis* by Elicitor Treatment

Young-Je Cho[1*], Eun-Ho Lee[1], Jun-Hyo Cho[1], Hye-Jin Park[1], Myung-Uk Kim[2], Hee-Young Jung[3]

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Phytochemical investigation of *Ligularia narynensis*

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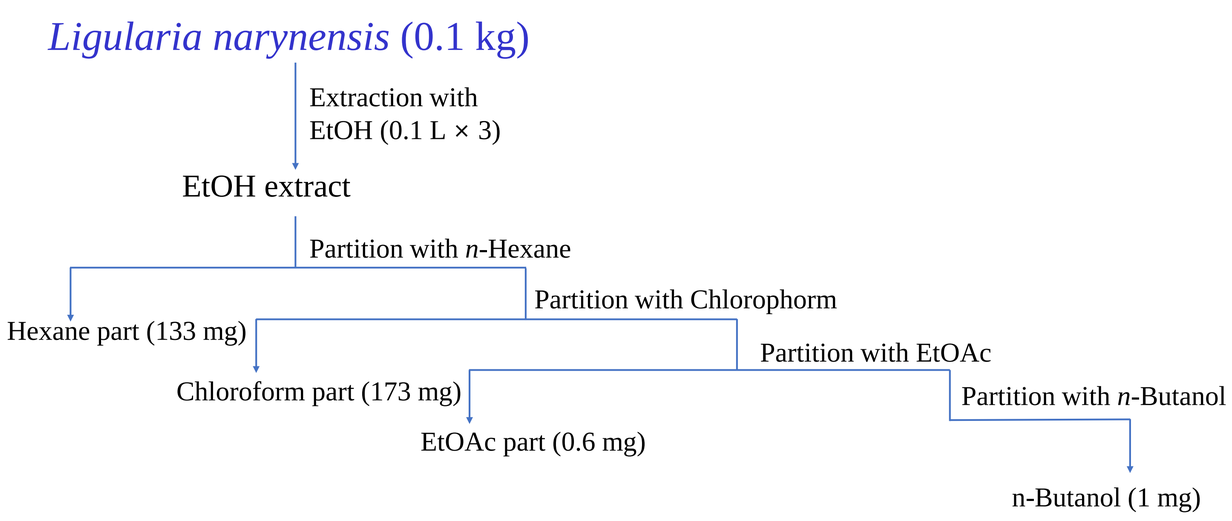
Abstract

In this work, the quantitative and qualitative analysis of phytochemical constituents from the root part of medicinal plant *Ligularia narynensis* from Kazakhstan have been made for the first time. Total bioactive components of *L. narynensis* such as organic acids (0.64 %), flavonoids (0.52 %) and together with moisture content (5.14 %), total ash (13.24 %), and extractives content (27.7 %) were determined. Eleven macro-micro elements from the ash of plant were identified, main contents of them were K (2214.13 µg/ml), Ca (391.31 µg/ml), and Fe (311.73 µg/ml) by using method of multi-element atomic emission spectral analysis. In addition, twenty amino and eight fatty acids were analyzed from the plant. The results showed that major contents of amino acids were glutamate (2452 mg/100g), and aspartate (1238 mg/100g), as well as in fatty acids were oleic (33.5 %) and linoleic acids (41.2 %), respectively. The liposoluble constituents extracted from *L. narynensis* by hexane were analyzed by GC-MS method. Total fifty compounds were separated and their relative contents were determined by area normalization in which the major constituents were 9, 12 – Octadecadienoic acid (Z, Z)- (16.70 %), Linoleic acid ethyl ester (11.13 %), n-Hexadecanoic acid (11.01 %), Lup-20 (29)-en-3-ol, acetate, (3.beta.)-(9.14 %), Olean-12-en-3-ol and acetate, (3-beta.)- (5.10 %), respectively.

Introduction

Ligularia is the genus of perennial herbs of the family Compositae, containing about 180 Eurasian species, 17 species growing in mountains of Kazakhstan. Some species in this genus have been used for a long time as folk remedies for their antibiotic, antiphlogistic, and antitumor activities. More than 27 *Ligularia* species have been used as traditional Kazakh and Chinese medicinal herbs for the treatment of fever, pain, inflammation, and intoxication, and to invigorate blood circulation. Previous studies confirmed the presence of sesquiterpenes, triterpenes, sinapyl alcohol derivatives, lignans, alkaloids, and steroids in *Ligularia*. Eremophilane sesquiterpenes are considered as the major secondary metabolites and taxonomic markers of *Ligularia* genus. More than 500 eremophilane sesquiterpenes have been reported from this genus. Additionally, oplopane sesquiterpenes have been reported from *L. narynensis*.

Extraction and isolation



Results

Table 1 – Quantitative analysis of bioactive constituents of *L. narynensis*

Content, %				
Moisture content	**Ash**	**Extractives**	**Organic acids**	**Flavonoids**
5.14	13.24	27.7	0.64	0.52

Table 2 – Composition of macro-micro elements in the ash of plant *L. narynensis*

Element	**Cu**	**Zn**	**Cd**	**Pb**	**Fe**	**Ni**	**Mn**	**K**	**Na**	**Mg**	**Ca**
µg /ml	1.57	2.58	0.05	0.66	311.73	0.36	11.73	2214.13	31.74	288.08	391.31

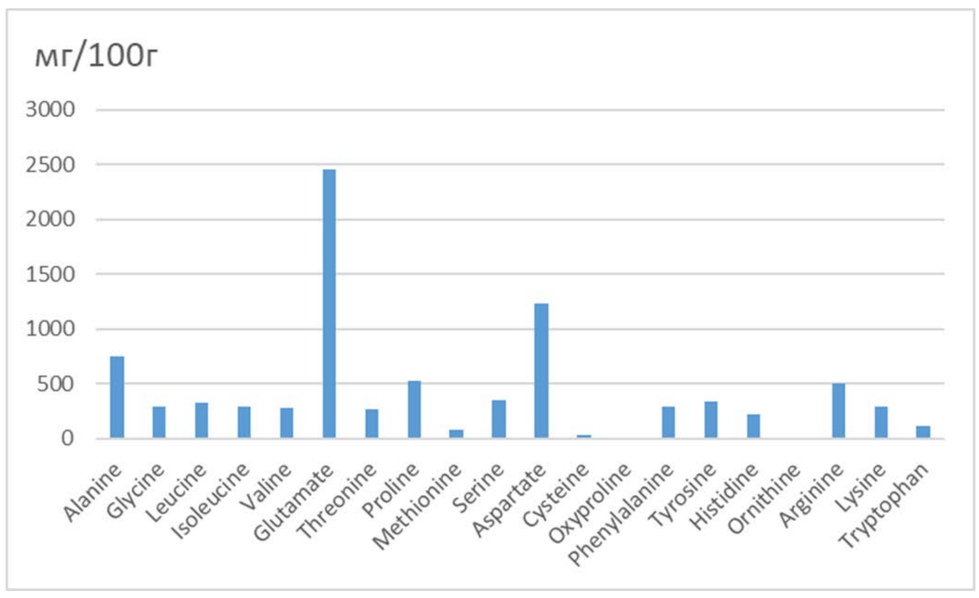


Fig. 1 Amino acids contents of *L. narynensis*

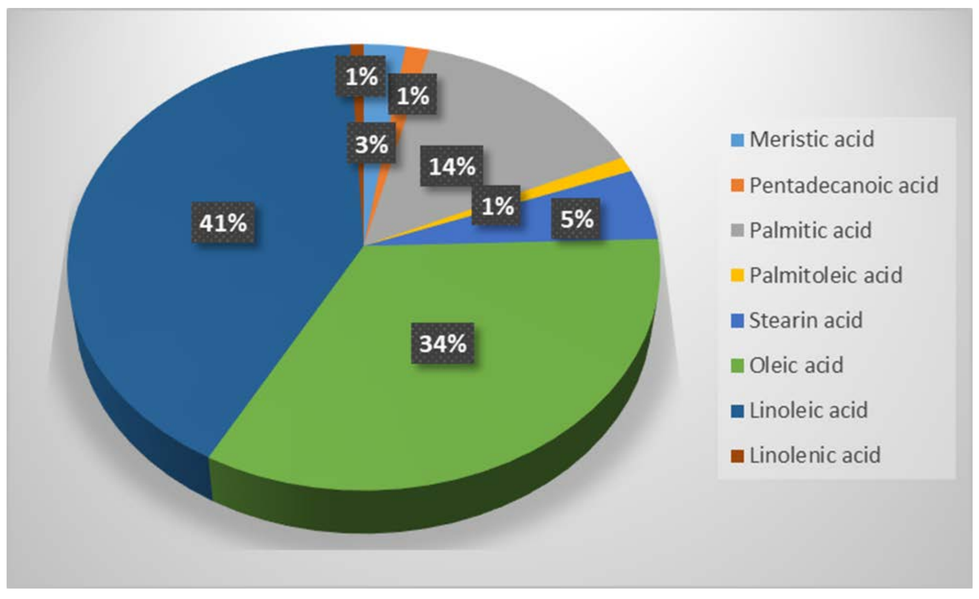
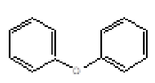
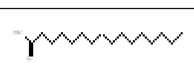
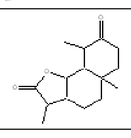
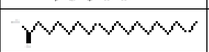
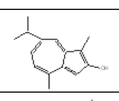
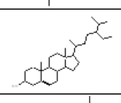
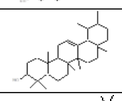
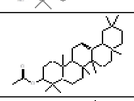
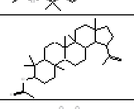
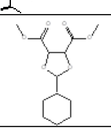


Fig. 2 Fatty acids contents of *L. narynensis*

Table 3 – The liposoluble constituents from the root parts of *L. narynensis*

Peak No.	Constituents	t_R (min)	Molecular Formula	Structure	MW	Content (%)
1	Diphenyl ether	11.03	$C_{12}H_{10}O$		170	3.41
2	n-Hexadecanoic acid	17.59	$C_{16}H_{32}O_2$		256	11.01
3	Hexadecanoic acid, ethyl ester	17.76	$C_{18}H_{36}O_2$		284	3.10
4	Naphtho[1,2-b]furan-2,8(3H,4H)-dione, octahydro-3,5a,9-trimethyl-, [3S-(3.alpha.,3a.alpha., 5a.beta.,9.alpha.,9a.alpha.,9b.beta.)]-	18.9	$C_{15}H_{22}O_3$		250	2.48
5	9,12-Octadecadienoic acid (Z,Z)-	19.19	$C_{18}H_{32}O_2$		280	16.70
6	Linoleic acid ethyl ester	19.28	$C_{20}H_{36}O_2$		308	11.13
7	Octadecanoic acid	19.43	$C_{18}H_{36}O_2$		284	4.43
8	Azulen-2-ol, 1,4-dimethyl-7-(1-methylethyl)-	19.83	$C_{15}H_{18}O$		214	2.48
9	.gamma.-Sitosterol	28.78	$C_{29}H_{50}O$		414	2.78
10	.alpha.-Amyrin	29.67	$C_{30}H_{50}O$		426	3.86
11	Olean-12-en-3-ol, acetate, (3.beta.)-	30.53	$C_{32}H_{52}O_2$		468	5.10
12	Lup-20(29)-en-3-ol, acetate, (3.beta.)-	31.15	$C_{32}H_{52}O_2$		468	9.14
13	2-Cyclohexyl-1,3-dioxolane-4,5-dicarboxylic acid, dimethyl ester	32.43	$C_{13}H_{20}O_6$		272	2.77

Conclusion

In summary, the quantitative and qualitative analysis of phytochemical constituents from root of medicinal plant *L. narynensis* of Kazakhstan have been made for the first time. As the results of this study, total bioactive components of *L. narynensis* were determined, eleven macro-micro elements from the ash of plant were identified together with twenty amino and eight fatty acids were quantified from medicinal plant. In addition, the liposoluble constituents of *L. narynensis* were analyzed by GC-MS method. Fifty compounds were isolated from hexane extract of the medicinal plant and their relative contents were determined. Presence of these bioactive constituents, may indicative that the plant has substances capable of promote a better brain activity, the contractile function of the cardiac and skeletal muscles. The plant extract has anti-inflammatory, antimicrobial and anticancer activities. From the results we can estimate that *L. narynensis* extracts poetically useful in medicine. Further and comprehensive investigation is scheduled to be implemented in the next research stage.

References

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Acknowledgements

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