WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 14, Issue 10, 1202-1208. Research Article ISSN 2277–7105

RESEARCH ON THE ABOVE-GROUND PARTS OF GINKGO BILOBA, A PLANT WIDESPREAD IN GEORGIA

Gelovani N.[1]*, Ghughunishvili D.[2], Tsikarishvili Kh.[3], Nishnianidze M.[4], Gvinjilia S.[5]

[1*]Technical University of Georgia, Professor of the Department of Pharmacy, Head of The Biocomplexes Reception and Research Center, Georgia, 0175.

[2]Technical University of Georgia, Professor of Pharmacy Department, Georgia, 0175.

[3]Technical University of Georgia, Associate Professor of Pharmacy Department, Georgia, Biocomplexes Reception and Research Center, Georgia, 0175.

[4]Technical University of Georgia, Assistant Professor of Pharmacy Department, Georgia, 0175.

[5]Technical University of Georgia, Academic Doctor of Chemistry, Georgia, 0175.

Article Received on
31 March 2025,

Revised on 21 April 2025,
Accepted on 11 May 2025

DOI: 10.20959/wjpr202510-36801

***Corresponding Author**
Gelovani N.
Technical University of Georgia, Professor of the Department of Pharmacy, Head of The Biocomplexes Reception and Research Center, Georgia, 0175.

ABSTRACT

There are 4 known species from the Ginkgo family: Gingko Biloba, Ginkgo yimaensis, Ginkgo apodes, Ginkgo adiantoides. Let's study the distribution area of Ginkgo biloba in Georgia. In Georgia, Ginkgo biloba was introduced to the Black Sea coast in the 19th century. It grows especially well on the Colchis Plain, where it reaches gigantic sizes. It also grows in eastern Georgia, namely in Tbilisi (in the Botanical Garden), in the Tsavkistskali River Gorge, in the southern part of the Sololaki Range and in Kakheti. In the current study, we identified the differences between Ginkgo biloba from the Kakheti region and Ginkgo biloba from the Tbilisi area. By comparing their external and chemical characteristics, we obtained a detailed analysis on which we conducted qualitative reactions for flavonoids (quercetin). It turned out that Kakhetian Ginkgo was richer in flavonoids.

KEYWORDS: Ginkgo biloba; phytochemical research; pharmacognostic research; natural products; complex mixtures.

1. INTRODUCTION

Natural products are one of the important components of complex mixtures and their therapeutic activity depends on the geographical location of the plant raw material, soil type, cultivation method, season, harvesting time, processing techniques and storage conditions. For the correct diagnosis of dried plant raw materials, we conducted observations on individual signs of the above-ground parts of Ginkgo biloba.

Plants are often contaminated, for various reasons, with toxic substances or heavy metals such as cadmium, lead, mercury, arsenic. Plants can be contaminated with insects, fungi and bacteria, which pose a threat to human health and call into question the reliability of plant raw materials.

Ginkgo biloba products are the best-selling phytopharmaceuticals, especially in Europe and the United States. In European medicine, G. biloba medicines are used to improve memory, treat neuronal disorders, and improve brain metabolism and peripheral blood circulation. The most well-known of its active substances are flavonoids and terpene lactones, but they also include allergenic and toxic compounds.

Desired 1. Female and male forms of Ginkgo biloba.

Ginkgo tree - a tree up to 31 m tall and 3-4 m in diameter, a dioecious deciduous tree. The plant adapts quite well to environmental conditions. Its branches are covered with smooth brown bark. Ginkgo biloba, which grows in China, can be 40 meters. In Europe, 18 meters, only ornamental species.

Ginkgo biloba is a bisexual plant (Figure 1.), pyramidal in shape. Male trees are weak, with green, racemose flowers, while female trees have spherical leaves. It blooms in May. After fertilization, it develops yellow fruits.

2. Main Part

Prospective research objects

The samples we collected are whole or partially crushed smooth petiole leaves, green in color. Parts of shoots are found, the total content of which did not exceed 10.01% of the weight of the raw material. After crushing the raw material, we passed it through a sieve with a hole diameter of 7 mm. The color is green, the smell is characteristic, the taste is sour with a slightly bitter-sour taste.

We transferred the resulting powder to a set of sieves and sieved it. Since the crushed plant raw materials should have a particle size of no more than 7.5 or 3 mm. To sieve the processed plant mass, I used the upper sieves with a 7, 5 or 3 mm aperture and the lower sieve with a 0.5 mm (0.25 mm) aperture. In my case, I had dried raw materials, since dried medicinal plant material has a fragile structure, the hole size of the lower sieve was 0.18 mm.

Medicinal plant raw materials, crushed to particles no more than 2 mm in size, are called powder. To sieve the powder, I used the upper sieve with a 2 mm aperture and the lower sieve with a 0.18 mm aperture.

Analysis of Ginkgo Biloba leaves distributed in Georgia

A green raw leaf of Ginkgo biloba was taken. In a well-lit place in daylight, the color was determined - the upper part is bright green, the lower part is grayish. The size is 5.3 in length and 6.1 in width, the size of the stalk is 7.2.

I chose 2 samples for the study. I obtained powder from a sample taken from the outskirts of Tbilisi and from the Kakheti region (village Dzirkok).

- Nanoparticles - 7g
- Particles with a size of 0.5 - 24g.

As for the raw leaves of the plant, I weighed 300g of raw leaves of Ginkgo biloba, crushed them using scissors, transferred them to a blender under constant stirring, transferred the resulting raw material to gauze and squeezed out the juice with a sieve to 53 ml, stored the resulting extract in the refrigerator.

I transferred the squeezed raw material to a drying plate and dried it, then transferred the dry mass into jars.

Figure 2. Ginkgo tree (Tbilisi)

Figure 3. Raw Ginkgo leaves.

Figure 4. Air-dried Ginkgo preparation.

Determination of smell - I took a Ginkgo leaf and rubbed it with my fingers. The smell was less noticeable, so I placed it in a porcelain bowl and poured hot water. As a result, the smell of Ginkgo intensified, a characteristic, freshly cut grass smell was released.

Determination of taste - I took a small part of a Ginkgo leaf and chewed it, spit out the water in my mouth, did not swallow it, the taste was bitter, sour, unpleasant. It does not contain poisonous substances.

It has been established that the main components of the chemical composition of Ginkgo biloba leaves, which provide their pharmacological activity, are flavone glycosides and terpene lactones.

The process of obtaining extracts from raw materials

I poured 100 ml of 80% diluted alcohol solution into one part of the selected and pre-cleaned samples (nanoparticles) and kept for 15 minutes under constant shaking conditions.

I poured 100 ml of 70% diluted alcohol solution into the 0.5 size particles and kept for 15 minutes under constant stirring conditions.

I filtered the resulting mixtures through gauze folded in four. I placed the resulting mixtures on Petri dishes and put them in a dryer at 70°C for about 6 hours.

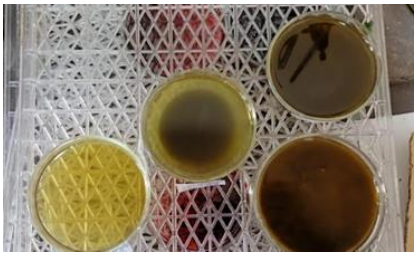

Figure 5. 70% and 80% alcohol solution test.

Figure 6. Ready-made preparations.

Raw material: Raw Ginkgo leaves (from Kakheti)

I chopped 320g of Kakhetian raw Ginkgo leaves with scissors, rubbed them in a mortar, transferred them to gauze, and squeezed out the extract to a volume of 95ml and put it in the refrigerator. I transferred the squeezed raw material to a drying plate and dried it, transferring the dry mass into jars.

We conducted a quality assessment of the liquid extract of Ginkgo biloba leaves. The results are as follows:

Sample 1 (root), extractive substances % - 25.7, density g/cm3 - 0.96, total flavonoids calculated on rutin - 4.89.

Sample 2 (Tbilisi), extractive substances % - 28.6, density g/cm3 - 0.96, total flavonoids calculated on rutin - 4.70.

Flavonoid content in the liquid extract by differential spectrophotometry

Sample 1 (root), optical density - 0.802, amount % - 5.09.

Sample 2 (Tbilisi), optical density - 0.799, amount % - 4.85.

Meteorological characteristics - $X=\bar{}5.08$, S=0.198, $S\bar{X}$=0.07, $X=\bar{0}.18$, ε=±3.53 %.

Table 1: Quality assessment of Ginkgo biloba, liquid extract of leaves.

Sample number	Extractive substances %	Density grams/centimetre[3]	Total flavonoids calculated on rutin
1. Sample (Kakheti)	25,7	0,96	4,89
2. Sample (Tbilisi)	28,6	0,96	4,70

Table 2: Flavonoid content in liquid extract by differential spectrophotometry.

Sample number	Optical density	Quantity %	Metrological characteristics
1 Sample (Kakheti)	0.802	5.09	$X=\bar{}5.08$ S=0.198 $S\bar{X}$=0.07 $X=\bar{0}.18$ ε=±3.53 %
2. Sample (Tbilisi)	0.799	4.85	

CONCLUSION

1. It has been established that the main components of the chemical composition of Ginkgo biloba leaves, which provide their pharmacological activity, are flavone glycosides and terpene lactones.
2. Pharmacognostic study of Ginkgo biloba leaves showed that samples distributed in the territory of Georgia, in particular in the Kakheti region, contain a large amount of flavonoid compounds.
3. We conducted an assessment of the quality of the liquid extract of Ginkgo biloba leaves. The result is as follows: sample 1 (root), extractive substances in % - 25.7, density g/cm3 - 0.96, the total amount of flavonoids in terms of rutin - 4.89.
4. Sample 2 (Tbilisi), extractive substances % - 28.6, density g/cm3 - 0.96, total flavonoids calculated on routine - 4.70.
5. The content of flavonoids in the liquid extract was determined by differential spectrophotometry:

Sample 1 (root), optical density - 0.802, amount % - 5.09.

Sample 2 (Tbilisi), optical density - 0.799, amount % - 4.85.

Meteorological characteristics - $X=\bar{}5.08$, S=0.198, $SX\bar{}=0.07$, $X=\bar{0}.18$, ε=±3.53 %.

6. The resulting extract can act as a medicine itself or become the basis for creating a complex medicine.

REFERENCES

1. T. Sugiyama, Y. Kubota, K. Shinozuka, S. Yamada, K. Yamada, K. Umegaki. Induction and recovery of hepatic drug metabolizing enzymes in rats treated with Ginkgo biloba extract. Food Chem. Tox, 2004; 42: 953-957.
2. Gelovani N., Tsintsadze T., Tsikarishvili Kh., Ghugunishvili D., Targamadze L., Nishnianidze M., Lomouri M. Determination of the amount of ascorbic acid,dehydroascorbic acid and ketogulonic acid in tissues of plant origin. Chemical Journal of Georgia, 2013; 2(13): 52-56.
3. E. Koch. Inhibition of platelet activating factor (PAF)-induced aggregation of human thrombocytes by ginkgolides: considerations on possible bleeding complications after oral intake of Ginkgo biloba extracts. Phytomed, 2005; 12: 10-16.
4. P.L. Moulton, L.N. Boyko, J.L. Fitzpatrick, T.V. Petros. The effect of Ginkgo biloba on memory in healthy volunteers. Phys. Behav., 2001; 73: 659-665.
5. https://en.wikipedia.org/wiki/Urasenke

6. Gelovani N., Goderdzishvili I. Tsikarishvili Kh. Targamadze L., Metreveli I. Isolation of anthracene derivatives from the leaves of aloe plant (Aloe arborescens). The International Union Scientific and Technical Conference "Environmental Protection and Sustainable Development" dedicated to the 80th anniversary of the birth of Professor Victor Dimitris-dze Eristavi, Doctor of Chemical Sciences, November, 2019; 158: 11-12.
7. Gelovani N., Akhalbedashvili R. The analysis of a chemical compound of fruits and cornelel stones (a cornelel ordinary or man's - (CÓRNUS MAS L.) Family dogwood) www.wjpr.net | Vol 12, Issue 21, 2023. | ISO 9001:2015 Certified Journal |
8. Gelovani et al. World Journal of Pharmaceutical Research extended in the form of Natural thickets in east Georgia. PROGRAM ABSTRACTS NOTEBOOK. Tbilisi-Georgia. Mai 17-19 2013. Georgian Technical University. 3-rd International Conference of Young Scientists P.45.
9. Goderdzishvili I., Gelovani N., Gvelesiani I., Targamadze L.. Analysis of plant raw materials containing anthocyanins by Bortreger. Ivane Javakhishvili Tbilisi State University. International Online Conference. "Compounds and Materials with Specific Properties" July 10-11, 2020. Tbilisi, Georgia.