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Original scientific paper

TRADITIONAL MEDICINAL USE OF SILVER BIRCH IN THE PIROT DISTRICT (SERBIA)

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Abstract: *A total of 631 informants were surveyed on the knowledge and use of medicinal plants, in the four municipalities of the Pirot District. Betula pendula (silver birch) was mentioned by 11 respondents for the following applications: against urinary tract inflammation, kidney and bladder diseases, gastric bacteria, kidney and bile sand, kidney and urinary tract diseases, prostate disease, proteins in the urine, and for kidney and urinary tract regeneration. The medicinal uses of silver birch leaves against gastric bacteria, as well as the use of the juice from birch tree for kidney and urinary tract regeneration can be considered novelties in our research because they were not mentioned in previously published ethnobotanical papers on the Balkans.*

Keywords: *Betula pendula*, silver birch, medicinal use, Pirot District

TRADICIONALNA LEKOVITA UPOTREBA BREZE U PIROTSKOM OKRUGU (SRBIJA)

Sažetak: *Anketiran je 631 ispitanik o poznavanju i korišćenju lekovitih biljaka u četiri opštine Pirotskog okruga.. Betula pendula (breza) je pomenuta od strane 11 ispitanika za sledeće primene: protiv urinarnih infekcija, lečenje bešike i bubrega. protiv bakterija u želudcu, bubrežnog i žučnog kamenca, bolesti bešike i bubrega, bolesti prostate, i proteina u mokraći i za regeneraciju bubrega i mokraćnih kanala. Lekovita upotreba listova breze protiv bakterija u želudcu, kao i uopotreba soka iz drveta breze za regeneraciju bubrega i mokraćnih kanala mogu se smatrati novinama našeg istraživanja, jer nisu pomenute u prethodno publikovanim etnobotaničkim radovima na Balkanu.*

Ključne reči: *Betula pendula*, breza, lekovita upotreba, Pirotski okrug

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1. INTRODUCTION

Betula pendula Roth, commonly known as silver birch, is a species of tree in the family Betulaceae, native to Europe and parts of Asia, though in Southern Europe. Silver birch grows in rare light forests, especially after wildfire in the belt of oak forests (Marković, 2013). It is present in the Pirot District at Stara planina Mt and Ruj Mt.

The silver birch contains significant amounts of flavonoid heterosides, and also tannins, resins, saponins, and essential oil (Marković et al., 2020; Pelagić, 2009; Sarić, 1989).

Sarić (1989) and Tucakov (1990) mentioned the use of silver birch buds and leaves for urinary tract treatment because they help the excretion of salt and water. The buds are also used in cosmetics to make shampoo. Tasić et al. (2001) mentioned the use of silver birch leaves against rheumatic pain, arthritis, and gout. The leaves and bark are used against skin diseases (Sarić, 1989). According to Pelagić (2009), silver birch buds and leaves are used for the secretion of urine and bile. It is a mild disinfectant for the urinary tract, and it is good for sweating in case of colds and elevated body temperature. The same authors state that the juice that leaks in the form of syrup, when a young birch tree is cut in early spring, contains mineral substances and organic acids, and can be drunk against inflammation of the kidneys and bladder, as well as against gout and rheumatism.

Silver birch can only be harvested with appropriate permits, as it is a protected plant species in Serbia under national legislation (Službeni glasnik Republike Srbije, 2010).

This study aimed to collect and research traditional knowledge about the use of silver birch in the Pirot District for medicinal purposes. The aim of the research was also to find traditional forms of medicinal use of silver birch, which have not been recorded in previous ethnobotanical research on the Balkan Peninsula.

2. MATERIAL AND METHODS

Studies on the knowledge and use of medicinal plants were conducted in the form of a population survey. The questionnaires on the knowledge and use of medicinal plants included residents of 144 villages in four municipalities of the Pirot District: Pirot, Babušnica, Bela Palanka, and Dimitrovgrad. A total of 631 respondents were surveyed with the questionnaire on knowledge and use of medicinal plants, of which 337 were men and 294 were women. The results of a study on the traditional medicinal use of silver birch were compared with previous ethnobotanical research on the use of this species on the Balkan Peninsula.

3. RESULTS

According to the results of the questionnaire on the knowledge and use of medicinal plants, siver birch was mentioned by 11 respondents (6 men, 5 women), i.e. 1.9% of the total number of respondents. Out of a total of 4817 reports collected in the Pirot District, only 12 reports reported the medicinal use of birch (0.25%). In terms of national structure, 10 respondents were of Serbian nationality, and one

respondent was of Bulgarian nationality. In the municipality of Pirot, 9 reports on the medicinal use of silver birch were given, in the municipality of Babušnica 1 report, in the municipality Bela Palanka 1 report, and in the municipality of Dimitrovgrad 1 report. The age of the respondents who mentioned the medicinal use of siver birch was 44 to 79 years.

Table 1. *Overview of the survey results on the use of Betula pendula in the population of the Pirot District.*

Municipality	Village	Nationality	Gender	Age	Plant part	Form	Medicinal use	Group
Pirot	Velika Lukanja	Srb.	M	62	folium	Infusion	Kidney and urinary tract diseases	Ur
Pirot	Visočka Ržana	Srb.	M	64	cortex	Decoction	Urinary tract inflammation	Ur
Pirot	Visočka Ržana	Srb.	Ž	79	folium	Infusion	Against gastric bacteria	Dg
Pirot	Vranište	Srb.	Ž	46	succus	Syrup	Kidney and utinary tract regeneration	Ur
Pirot	Gnjilan	Srb.	Ž	78	folium	Infusion	Urinary tract inflammation	Ur
Pirot	Mali Jovanovac	Srb.	M	55	folium	Infusion	Proteins in the urine	Ur
Pirot	Mali Jovanovac	Srb.	M	55	folium	Infusion	Prostate disease	Rp
Pirot	Ponor	Srb.	M	77	folium	Infusion	Kidney and bile sand	Ur
Pirot	Rsovci	Srb.	M	60	folium	Infusion	Urinary tract inflammation	Ur
Babušnica	Zavidince	Srb.	Ž	44	folium	Infusion	Kidney and bladder diseases	Ur
Bela Palanka	Klisura	Srb.	M	56	folium	Infusion	Kidney and bladder diseases	Ur
Dimitrovgrad	Boljev Dol	Bug.	Ž	57	folium	Infusion	Urinary tract inflammation	Ur

Note: Group of diseases: Dg – digestive, Ur – urinary, Rp – reproductive.

Leaves of silver birch were most often used in the form of an infusion (10 reports), and less often bark in the form of decoction (1 report), or juice from the three in the form of syrup (1 report) (Table 1, 2).

Table 2. *Medicinal uses of silver birch mentioned by respondents with parts of plant and forms used.*

Medicinal use	Number of respondents	Part/parts of the plant	Form
Urinary tract inflammation	3	leaf (*folium*)	infusion
Urinary tract inflammation	1	bark (*cortex*)	decoction
Kidney and bladder diseases	2	leaf (*folium*)	infusion
Kidney and bile sand	1	leaf (*folium*)	infusion
Kidney and urinary tract diseases	1	leaf (*folium*)	infusion
Kidney and urinary tract regeneration	1	juice from three	succus
Prostate disease	1	leaf (*folium*)	infusion
Proteins in the urine	1	leaf (*folium*)	infusion

The greatest number of respondents mentioned internal use against urinary tract inflammation of the birch leaves (3 reports) in the form of an infusion, and birch bark (1 report) in the form of decoction (Table 1, 2). The twice-mentioned medicinal use of silver birch leaves in the form of infusion was against kidney and bladder

diseases. One respondent each mentioned the use of leaves in the form of infusion against gastric bacteria, kidney and bile sand, kidney and urinary tract diseases, prostate disease, and proteins in the urine. One respondent mentioned the use of juice from the three in the form of syrup for the treatment of kidney and urinary tract regeneration (Table 1 and 2).

4. DISCUSSION

The results of our study are compared with previous ethnobotanical research on the traditional medicinal use of plant species in the Balkans.

Šarić Kundalić et al. (2010) mentioned the use of silver birch in Bosnia against renal gravel in the form of juice, and against renal ailments in the form of tea, which were similar medicinal uses, compared to our study.

Pieroni et al. (2011) recorded the use of silver birch against bruises externally during ethnobotanical research in Pešter in Southwestern Serbia, which had different medicinal uses compared to our research.

Popović et al. (2012) found that the population from Deliblato Sands used „sister" species *Betula verrucosa* internally as an anti-anemic, antiscorbutic, antihelmintic, antipyretic, diuretic, and antiseptic agent, which are different medicinal uses compared to our research.

Šavikin et al. (2013) mentioned the use of silver birch against hyperglycemia in the Zlatibor District, which was different compared to our study.

Mustafa et al. (2015) mentioned the use of the „sister" species *Betula alba* as a diuretic, and against urinary disorders, in Kosovo and Metohija, which were similar medicinal uses, compared to our study. The same authors mentioned the medicinal use against edema and alopecia, which are different medicinal uses compared to our research.

In the ethnobotanical research on Suva Planina Mt in Southeastern Serbia, Jarić et al. (2015) noted that silver birch was used for kidney problems, which are similar medicinal uses compared to our research.

Pieroni et al. (2015) reported the use of silver birch as a diuretic, which was similar applications compared to our research.

Saric Kundalic et al. (2016) noted the use of *B. pendula* against urogenital system disorders, which was similar medicinal uses, compared to our study. The same authors mentioned the uses against gall and liver ailments, malaria, irregular heartbeat, common cold, blood purification, skin ailments, and gout, which were different in comparison with our research.

Janaćković et al. (2019), noted for the Negotin Krajina the use of silver birch for immune system strengthening, which was different as in our research.

Matejić et al. (2020) mentioned for the Svrljig regions the use of silver birch against skin diseases, and productive cough, which were different in comparison with our research. The same authors mentioned for the Timok region the use of silver birch for the treatment of kidney colic, which was a different medicinal application compared to our research.

Mustafa et al. (2020) mentioned the use of silver birch for the treatment of the urinary system, and for the bladder, in Štrpce in the southern part of Kosovo and Metohija, which the respondents in our research also mentioned.

Mullalia et al (2021) in the Anadrini region of Kosovo and Metohija recorded the use of silver birch against prostate diseases, which was the same use as in our research. The same authors mentioned the medicinal use of silver birch against alopecia, which was a different use compared to our research.

The medicinal uses of silver birch leaves against gastric bacteria, and the use of the juice from the birch tree for kidney and urinary tract regeneration were not mentioned in previous ethnobotanical research on the Balkan Peninsula, so the mentioned uses can be considered the novelties of our research.

The protection of the populations of *B. pendula* in the Pirot District should be taken into consideration because it is on the list of protected species in Serbia (Službeni glasnik Republike Srbije, 2010).

5. CONCLUSION

Based on the presented data, which were obtained by surveying the rural population in four municipalities of the Pirot District, it can be concluded that the silver birch (*Betula pendula*) was usually used for a urinary group of diseases: kidney and urinary tract diseases in general, urinary tract inflammation, kidney and bladder diseases, kidney and bile sand, prostate disease, and proteins in the urine. Silver birch was used in the Pirot District less often for the group of digestive diseases (against gastric bacteria), and group of reproductive diseases (prostate disease).

Different and new uses, which were mentioned by respondents in the Pirot District in comparison with previous research on the Balkan Peninsula, were the use of birch leaves in the form of infusion against gastric bacteria, and the use of juice from trees for kidney and urinary tract regeneration.

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Summary

The subject of this paper was the investigation of the ethnopharmacological application of silver birch in the Pirot District. The study was conducted in the form of surveys among the rural population (631 informats) in four municipalities Pirot, Babušnica, Bela Palanka, and Dimitrovgrad. The results were compared with previous ethnobotanical research on the medicinal use of this plant species on the Balkan Peninsula.

Silver birch (*Betula pendula*) was mentioned by 11 respondents. Four respondents reported the internal use of birch against urinary tract inflammation, of which three respondents reported the use of leaves in the form of infusion, and one respondent reported the use of bark in the form of decoction. Two respondents reported the use of birch leaves in the treatment of kidney and bladder diseases. One respondent each reported the use of leaves in the form of infusion against gastric bacteria, kidney and bile sand, kidney and urinary tract diseases, prostate disease, and proteins in the urine. One respondent mentioned the use of juice from the three in the form of syrup for kidney and urinary tract regeneration.

The medicinal uses of silver birch leaves against gastric bacteria, as well as the use of the juice from birch tree for kidney and urinary tract regeneration were not mentioned in previously published ethnobotanical papers on the Balkan Peninsula, so the mentioned applications can be considered the novelties of this research.

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Rezime

Predmet ovog rada bilo je proučavanje etnofarmakološke upotrebe breze u Pirotskom okrugu (Jugoistočna Srbija). Istraživanje je sprovedeno u vidu ankete među ruralnim stanovništvom (631 ispitanik) u četiri opštine: Pirot, Babušnica, Bela Palanka i Dimitrovgrad. Rezultati su upoređeni sa prethodnim etnobotaničkim istraživanjima o lekovitoj upotrebi ove biljne vrste na Balkanskom poluostrvu.

Breza (*Betula pendula*) je pomenuta od strane 11 ispitanika. Četiri ispitanika su pomenula unutrašnju upotrebu breze protiv urinarnih infekcija, od kojih su tri ispitanika pomenula upotrebu listova u vidu infuzuma, a jedan ispitanik je pomenuo upotrebu kore u vidu dekokta. Dva ispitanika su pomenula upotrebu listova breze za lečenje bešike i bubrega. Po jedan ispitanik je pomenuo upotrebu listova breze u vidu infuzuma protiv bakterija u želudcu, bubrežnog i žučnog kamenca, bolesti bešike i bubrega, bolesti prostate, i proteina u mokraći. Jedan ispitanik je pomenuo upotrebu soka iz drveta u vidu sirupa za regeneraciju bubrega i mokraćnih kanala.

Lekovita upotreba listova breze protiv bakterija u želudcu, kao i upotreba soka iz drveta breze za regeneraciju bubrega i mokraćnih kanala nisu pomenute u prethodno publikovanim etnobotaničkim radovima na Balkanskom Poluostrvu, pa se pomenute upotrebe mogu smatrati novinama ovog istraživanja.