Medicinal plants and phytotherapy

ABSTRACT

The plant kingdom is a crucial component of human nutrition and, consequently, the foundation of human sustenance. Humans have long recognized that specific plant-based foods provide essential substances that contribute to health, leading to the discovery of their medicinal properties. As a result of such chemical investigations, there has been an effort to synthetically produce the same or similar compounds that could replace natural products from the plant world in medical treatment and health maintenance. Consequently, modern medicine has increasingly relied on synthetic drugs, often overlooking the therapeutic value of many plants. However, despite this neglect, there is a growing movement to reintegrate effective natural plant compounds into the treatment of various diseases, as synthetic chemical compounds cannot fully substitute for plant-derived medications.

The objective of this study was to collect and identify medicinal plant species in the Konjuh Mountain area across seven locations with varying geoecological characteristics. Field research was conducted in three municipalities within the Tuzla Canton (Kladanj, Živinice, and Banovići), covering seven sites, each measuring 3,000 m², with altitudes ranging from 560 to 1,100 m. During the investigation, 109 medicinal plant species were identified, including endangered and endemic varieties. Additionally, a survey was conducted among the local population of Konjuh Mountain regarding their knowledge, recognition, and collection of medicinal herbs. Results from the survey, which involved 50 participants of various ages, indicate that alternative medicine holds a significant role in treatment approaches and is viewed as a more accessible method of healing.

Keywords: medicinal, plants, Konjuh, survey, treatment

1. INTRODUCTION

With approximately 6,340 reported species of vascular plants, the Balkan region (Turrill, 1929), in comparison to the 10,500 species recognized in Flora Europaea, is one of the most significant centers of biodiversity in Europe. Within its 51,129 km², Bosnia and Herzegovina (Western Balkan Peninsula; Southeast Europe) hosts around 3,600 species of vascular plants. Despite the substantial floristic diversity of this country, data on the use of plants in traditional medicine is scarce. Apart from one "systematic study" pertaining to the entire country (Redžić, 2007), and research focusing on the central, western, and southern parts of Bosnia and Herzegovina (Šarić-Kundalić et al., 2010), as well as the medicinal flora of Konjuh Mountain (Huseinović et al., 2023), no other systematic investigations exist.

The flora of Konjuh Mountain is particularly diverse and unique, offering an abundance of free, natural, healthy, and unpolluted food (Huseinović et al., 2021; 2023). The vitamins, minerals, and enzymes present in wild edible herbs confer medicinal properties, as these substances enhance the body's resilience, positively influence metabolic processes, and improve overall health. Some edible plants also exhibit therapeutic effects for respiratory, digestive, and urinary ailments. Additionally, many wild aromatic plants are utilized to enhance appetite, improve digestive processes, and alleviate gastrointestinal disturbances (Huseinović, 2017; Grlić, 1990). Medicinal herbs are employed in human phytotherapy, specifically the parts of these herbs or their extracts (Huseinović et al., 2023; Huseinović et al., 2017; Šarić, 1989; Schafner, 1999).

The government of the Tuzla Canton has adopted a law designating part of Konjuh Mountain, covering 8,016 hectares, as a Protected Landscape "Konjuh," thereby listing this area as part of Bosnia and Herzegovina's cultural heritage. The Konjuh massif is covered with dense forest communities predominantly composed of conifers (pine, fir, and spruce), beech, maple, and, to a lesser extent, oak. In the areas of Zelemboja, Hambarišta, Zidine, and Mali Konjuh, the rare and medicinal gentian (*Gentianalutea*) is found, which is protected and endangered on this mountain, and unfortunately very rare due to overexploitation. Konjuh serves as a habitat for diverse medicinal and wild edible plants, with the most widespread being wild thyme (*Thymus serpyllum*).

The aim of this study is to systematically gather data on the use of wild medicinal plants in the therapy of individuals from the Konjuh Mountain region (northeastern Bosnia and Herzegovina). Specifically, we will (i) supplement our current knowledge by focusing on northeastern Bosnia and Herzegovina, (ii) strengthen and expand the relevant database for this area through the creation of a taxonomic and phytogeographic study, specifically selecting villages and locations that have not been previously studied and involving individuals of all age groups, and (iii) determine the level of recognition, knowledge, and use of medicinal herbs among the local population.

2. MATERIAL AND METHODS

The research conducted in this study consists of both field and laboratory components. Field investigations were carried out in three municipalities within the Tuzla Canton (Kladanj, Živinice, and Banovići) across seven sites, each covering an area of 3,000 m², with altitudes ranging from 560 to 1,100 m. At each site, parameters were determined from the lowest to the highest elevations, including topographic points, altitude, geographic coordinates, slope, and aspect of the terrain (GPS), edaphic factors (according to Braun–Blanquet, 1964), identification in accordance with the principles of the International Code of Phytosociological Nomenclature (Weber et al., 2000), and the creation of photographic documentation. During the collection of plant material from natural habitats, consideration was given to the quantity of material harvested and its sustainability. Plant species identification was conducted based on references (IUCN, 1996; Domac, 1994; Gursky, 1990; and Šilić, 1984). Among the methods used, it is important to highlight the survey method for interviewing respondents, the preparation of a herbarium, and the development of analytical and synthetic tables presenting all medicinal plants along with their chemical compositions and therapeutic effects. Ethnobotanical interviews were utilized as one of the primary methods for data collection. All participants provided consent to participate in the research. The ethnobotanical survey form included: the name and age of the respondent, area/village, time of conduct, local name of the medicinal herb, plant part used, preparation method, and purpose of use. The study involved discussions with approximately 50 respondents. Collected specimens were herbarium-preserved using standard methods (Nikolić, 1996). Following taxonomic identification (Domac, 1994), the herbarium specimens were labeled with their Latin name, vernacular name, collection locality, and the date of collection.

To enhance the interpretation of medicinal herb usage, various biomedical works will be utilized (Ranđelović et al., 2012; Leporatti et al., 2003; Ivancheva et al., 2000).

3. RESULTS AND DISCUSSION

During this research on Konjuh Mountain, 109 medicinal plant species were identified across seven sites. Some plant species were found in specific micro-locations, which may be a result of climatic or anthropogenic factors, while certain species were present at a larger number of sites.

It is important to note that a significant number of the identified medicinal plants are utilized in both traditional and official phytotherapy, indicating the importance of these resources in generating pharmacoeconomic benefits (De Fao et al., 1993; Avci et al., 2006).

3.1 Phytocenological recording on the Konjuhmountain

Seven phytosociological recordings were conducted in the field to encompass various plant communities, aiming to gather as much data as possible on the medicinal plants present on Konjuh Mountain. The phytosociological recordings were carried out at the following locations: Tuholj, GornjaVišća, Katranica, Zlaća, Paučko Lake, MuškeVode, and Brataljevići.

Table 1.Characteristics of the locations where plant material was collected

Recording number	**1**	2	3	4	5	6	7

Site	Tuholj	Gornja Višća	Katranica-Heljdovište	Zlaća	Paučko jezero (Gorsko oko)	Muške vode	Brateljevići
Altitude	1000 m	750 m	920 m	600 m	650 m	753 m	560 m
Exposition	South	East	South	South	South	East	East
Inclination	Downhill	Steep	Steep	Steep	Flat	Steep	Flat
Size of the explored area	3000 m^2	3000 m^2	3000 m^2	3000 m^2	3000 m^2	3000 m^2	3000 m^2
Coverness	90%	100 %	90 %	90 %	80 %	75 %	80 %

3.2 Pharmacodynamic analysis of medicinal herbs from Konjuh Mountain.

All medicinal plant species are presented in tabular form along with their general characteristics, chemical composition, and therapeutic effects. A large number of plant species exhibit multiple medicinal properties, as well as nutritional benefits, which is one of the primary reasons to increase the use of medicinal herbs not only for treatment purposes but also for health protection.

Table 2: Overview of medicinal herbs from Konjuh Mountain by families.

Adoxaceae				
O/N	**Plant species**	**Chemical disposition**	**Used part of the plant**	**Medicinal use**
1.	*Sambucus nigra*	essential oils, tannin, sugar, resins, acids	flower, leaf, fruit, crust, root	analgetic, antidepressant, antidijabetic, antineuralgic, antioxsidant, antipyretic, antireumatic, antiseptic, antisspazmodic.
2.	*Sambucus ebulus*	tannins, flavonoids, essential oil, resin, sugars, choline, and organic acids	berries, leaves i root.	urinary system, cough mildanceand relief of hoarseness.
Aquifoliaceae				
1.	*Ilex aquifolium*	bitter substance, ilicin, wax, gum, ilex acid	Leaves and berries	depression, neurosis i headache
Anacardiaceae				
1.	*Cotinuscoggygria*	tannin, essential oils, coloured materies, vitamin C, E etc.	Leaf and crust	diarrhea, periodontitis, hemorrhoids, stomach ulcer, and mouth ulcers
Apiaceae				
1.	*Daucus carota*	carotene, vitamin A, sugar, B-group vitamins, vitamin H, vitamin E, pantothenic acid, essential oil, pectin, glutalin, lecithin, asparagine, cellulose, mucilage, and starch	root, seeds and leaf	anemia, arteriosclerosis, liver diseases, occurrence of worms, intestinal diseases, stomach ulcer, relieves heartburn, for rheumatism, laxative, sore throat or early stages of pneumonia, colds and flu, skin diseases, cleanses the blood, as well as for urinary tract infections.
Araliaceae				
1.	*Hedera helix*	triterpenicsaponins, flavonoids, pollens, sterols,	leaf	bronchitis, cough, skin diseases, ringworm and acne, blisters and calluses, dandruff, polyps and growths in the nose, tonsillitis, gallstones and

		and essential oil		kidney stones, arteriosclerosis.
Asteraceae				
R/B	**Plant species**	**Chemical disposition**	**Used part of the plant**	**Medicinal use**
1.	*Achillea millefolium*	essential oil, anhilin, matricin, flavonoids, and salicylic acid.	Whole plant	stimulates kidney function, promotes circulation, rheumatism, gout, nosebleeds.
2.	*Artemisia absinthium*	sesquiterpene lactones, essential oil, flavonoid artemisinin, tannins, saponins, organic acids, vitamin C, carotene, Mb, Se, Br	Leaf and flower	It is used for poor gastric functions, poor digestion, and gastric discomfort; it improves the functioning of hormonal glands.
3.	*Cichorium intybus*	levulose, fructose, pentosan, alkaloids, bitter glycoside intibin, proteinaceous substances, sugar, resin, high in potassium.	Whole plant	enhances the function of the digestive organs, liver, circulation, and acts as a diuretic.
4.	*Cirsium arvense*	Inulin and proteins	Root and leaf	It is an edible plant; young shoots and leaves can be consumed.
5.	*Sonchus arvensis*	mineral salts, vitamin C, and proteins.	Root and leaf	anti-inflammatory effects, for asthma, cough, and calms the nerves.
6.	*Hieracium pilosella*	bitter substances, tannins, resins, mucilage, flavonoid derivatives.	Whole plant	treatment of certain skin diseases (ringworm), bladder inflammation, kidney stones.
7.	*Petasites hybridus*	glycosides, coumarins, organic acids, Mb, Se	Leaf, root, juice	For pneumonia, bronchitis, cough, asthma, cramps, headaches, migraines, rheumatic pain, gout, nerve pain, and for withdrawal from strong narcotics and as an analgesic.
8.	*Taraxacum officinale*	bitter substances, resins, wax, essential oil, flavonoids, inulin, heterosides, carbohydrates, minerals, vitamin C, provitamin A, K, Fe, N, Mg, organic acids.	Root, leaf, flower	For the treatment of the liver, intestines, gallbladder, blood, in cases of oliguria due to water diseases, diabetes, asthenia, kidney insufficiency, weak bladder, bacterial infections of the bladder, in cases of gout, rheumatism, skin conditions, Alzheimer's disease (flower), osteoporosis (root, leaf, and flower).
9.	*Matricariachamomilla*	essential oils, phytosterols, tannins, glycosides, mucilage, vitamin C, niacin, mucilage, natural gum, proteins, essential oils, and	Flower and leaves	anti-inflammatory, helps with all inflammatory conditions, and with various cramps (especially in infants and children).

		other substances.		
10.	*Tussilago farfara*	Glycosides, saponins, carotenoids, polysaccharides, essential oil, flavonoids, malic, tartaric, and ascorbic acid, macro and microelements.	Whole rootless plant	Lung and respiratory tract diseases accompanied by a severe cough.
1.	*Allium ursinum*	Glycoside allicin, essential oil, ascorbic acid, mineral substances.	Leaves and bulbs.	Reduces fat content in the blood, lowers blood pressure, used for arteriosclerosis and digestive issues, and externally for chronic rashes.
Asperagaceae				
1.	*Convallaria majalis*	Glycosides, flavonoids, alkaloids, saponins, malic and citric acid, essential oil, vitamin C, macro and microelements.	Flower, leave and root.	Glycosides convallatoxin and convalloside, when properly dosed, help with heart diseases.
Aspleniaceae				
1.	*Ceterach officinarum*	Tannin and organic acids.	Above-ground part of the plant.	Treatment of spleen diseases, used as a diuretic, to promote sweating, and to cleanse the blood.
Betulaceae				
1.	*Betula pendula*	Sugar, a lot of K, Ca, and Fe. The leaves are rich in vitamin C, carotene, vitamin E, and minerals.	Leaves and flower buds, young branches, bark, and sap.	Used for rinsing in bacterial and inflammatory diseases of the urinary tract and for sand in the kidneys, as well as for rheumatic ailments.
2.	*Corylus avellana*	Betulin, oil, minerals, quercetin, caffeic acid.	Leaf, fruit and crust.	In cases of inflammation of the veins and hemorrhoids, for diarrhea and heavy menstrual bleeding, exhaustion, and anemia.
Baraginaceae				
1.	*Pulmonaria officinalis*	It contains tannins with a lot of polyphenols, a small amount of alkaloids, carotene, and vitamin C.	Above-ground part of the plant.	Lung diseases, pain in the lungs, various types of cough, valued in folk medicine as a good means for inducing sweating, cleansing the blood, against inflammatory conditions, for hoarseness, and for bladder, stomach, and intestinal diseases.
Brasicaceae				
1.	*Capsella bursa-pastoris*	Amines, glycosides, flavonoids, tannins, organic acids, inositol, saponins, vitamin C, thiamine, riboflavin.	Whole plant	Treatment of various types of bleeding, both external and internal, women's diseases, and as assistance during pregnancy and childbirth; it helps balance blood pressure.
Caprifoliaceae				
1.	*Valerianaofficinali*	Essential oil,	Rhizome with root.	Treatment of insomnia, disturbed psychophysical

	s	alkaloids, organic acids, tannins, glycosides, phytosterols, resins, Fe, Se		states, i.e., nerve diseases and all types of neuroses, heart diseases, diseases of the stomach and intestines, head ailments, respiratory organ diseases, women's diseases, urinary system diseases, high blood pressure, muscle cramps, painful conditions of joints and bones, and gallbladder pain and discomfort.
2.	*Knautia arvensis*	Tannins and riboflavine.	Young leaves	For external dressing and rinsing of wounds, cleanses the blood, reduces itching in cases of plague and urticaria.
			Caryphyllaceae	
1.	*Silene vulgaris*	Saponin, carotene, and vitamin C.	Young leaves and root.	The young leaves are edible and are harvested before the plant blooms, used in salads and stews.
			Crassulaceae	
1.	*Sempervivumtectorum*	Polysaccharides, tannins, mucilage, flavonoids, alkaloids, resin, calcium malate, triglycerides, formic and malic acid.	Leaf	External use as a balm for wounds that heal poorly, burns, eye and ear inflammation, and leg cramps. As a tea, it is consumed for sore throat, fever, heavy menstrual bleeding, and it also helps with intestinal worms.
			Cannabaceae	
1.	*Humuluslupulus*	Cones contain resinous substances that represent a mixture of hop acids, essential oil, flavonoids, coumarins, tannins, alkaloids, and vitamins.	Whole plant	Insomnia and mental unrest, stimulates appetite, for spleen and liver diseases, for jaundice, inflamed breasts, bedwetting and severe emissions, water diseases, rheumatism and gout, sprains and swelling, for stones in the kidneys and bladder.
			Convolvulaceae	
1.	*Convolvulus sepium*	Resin, tannin, flavonoids.	Root and leaf	Resin acts as a laxative.
			Carnaceae	
1.	*Cornus mas*	The fruit contains sugar, organic acids, tannins, vitamins, and phytoncides. The bark contains the glycoside cornin, tannins, and organic acids. The leaves contain vitamins C and E.	Ripe fruit and wood crust.	From the fruits, syrup for juice is most often made, or they are processed into jams, liqueurs, etc. Due to the astringent effect of tannins, it is used for the treatment of diarrhea.
			Crassulaceae	
1.	*Sedum rupestre*	Rutin, various glycosides, alkaloids sedine, sedamin, piperidine, resin, rutin, tannin,	Young shoots	Bowel diseases – parasites and worms in the intestines, polyps and hemorrhoids, diseases of the blood vessels, in arteriosclerosis, high blood pressure, diseases of the lungs and respiratory tract, liver and gallbladder diseases.

		resins, gums, tannic acids, sugar, mucilage, vitamin C.		
Cupressaceae				
1.	*Juniperus communis*	Essential oil, flavonoid glycosides, tannins, invert sugar, pectin, gums, resins, and waxes.	The whole plant is medicinal, but primarily the fruits are gathered.	Juniper acts as: antibacterial, antidiabetic, anti-rheumatic, antiseptic, aromatic, depurative, detoxifying, digestive, diuretic, emmenagogue, cardiotonic, carminative, neurotonic, rubefacient, spasmolytic, urinary antiseptic, vermifuge.
Dennstadetiaceae				
1.	*Pteridium aquilinum*	Starch, tannin, mucilage, bitter compounds, fatty and essential oil, mineral substances.	Youthful shoots and rhizome.	Ragweed is used in the treatment of gastric and intestinal catarrh.
Dryopteridaceae				
1.	*Dryopteris filix-mas*	Filicin, filmaron, aspidinol, tannins, flavonoids, and essential oil.	Young shoots.	The young shoots are edible and are gathered when they are still curled in a spiral.
Ericaceae				
1.	*Vaccinium myrtillus*	Tannins, anthocyanins, flavonoid glycosides, organic acids, pectin, invert sugar, vitamin C, and beta-carotene.	Leaves and fruit.	It is used for the treatment of diabetes and urinary tract diseases. Due to the anthocyanins that give them their blue color, they are effective for improving vision.
2.	*Calluna vulgaris*	Glycosides, tannins, saponins, and mineral substances.	Branches with leaves and flowers.	In cases of kidney and bladder diseases, as well as cough and rheumatism.
Equisetaceae				
1.	*Equisetum arvense*	Silicic acid, flavonoids, derivatives of caffeic acid, quartz acid, pyridine alkaloids, tannic acid, resin, bitter substances, sitosterol, vitamin C, carotenoids, K, Ca, Na, S.	Only sterile green stems without flower spikes.	In cases of kidney stones, for stomach bleeding, cleanses the blood, used against obesity, metabolic diseases, inflammation of the pleura, water diseases, willow herb, typhus, enlarged tonsils, and anemia, for sore throat and gum inflammation, for fistulas, and for wounds that heal slowly
Fabaceae				
1.	*Lotus corniculatus*	Cyanogenic glycosides lanamarin and lotaustralin, tannins, mucilage, essential oil, vitamin C, and	Young leaves, flowers.	It improves heart function, has a calming (sedative) effect, acts against parasites, weakness, and bloating, stimulates digestion, relieves cramps, and has anticancer properties.

		carotene.		
2.	*Melilotus officinalis*	Coumarin, flavonoids, resin, tannin, mucilage, bitter substances.	The tips of the plant's branches in bloom.	Cough, uterine and intestinal cramps, kidney diseases, headaches, migraines, arteriosclerosis, gout, diseases of the stomach and intestines, insomnia, neuralgias, and palpitations, as it calms well.
3.	*Trifolium repens*	Carbohydrates, coumarins, isoflavonoids, flavonoids, saponins, acids, resins, essential oil, fats, vitamins, and minerals.	Youthful leaves, flower heads, and root.	It is used against gout, rheumatism, and fever; blood cleansing tea.
4.	*Trifolium pratense*	Trifolin, essential oil, vitamin C.	Young leaves and flowers.	In cases of menopause, prevention of osteoporosis, for expectoration, in asthma and colds.
5.	*Vicia cracca*	Carbohydrates, flavonoids, saponins, fats, vitamins, and minerals.	Seeds.	The seeds are edible, ground, and used in the preparation of porridge.
6.	*Anthyllis vulneraria*	Tannins, saponins, pigments from the flavonoid group: xanthophyll and anthocyanin, mucilage.	Flower	It is used for the treatment of wounds that heal slowly.
7.	*Vicia grandiflora*	Carbohydrates, flavonoids, saponins, fats, vitamins, and minerals.	Above-ground part of the plant.	It serves as a good fodder and honey plant.
			Fagaceae	
1.	*Quercus petraea*	Tannins, organic acids, flavonoid quercetin, triterpenoids, steroids, catechins, pantothenic acid, vitamins B1, B2, B6, C.	Youthful leaves, bark, and acorn.	Treatment of inflamed mucous membranes of the stomach and intestines, gastric and intestinal catarrh, diarrhea, bites, infections, kidney inflammation – nephritis, liver and pancreas issues, and in the form of tea for gargling to treat inflammation of the oral mucosa, throat, and esophagus, for regulating thyroid function, and anal bleeding.
			Gentianaceae	
1.	*Gentiana lutea*	Bitter glycosides, trisaccharidegenci anoza, alkaloid gencianin, xanthone, ascorbic acid, flavonoids.	Root	It stimulates the secretion of saliva and gastric juice, helps with stomach issues, cleanses the blood, treats anemia, fainting spells, and nervous sensitivity, liver and spleen diseases, promotes bile secretion, strengthens the body's defenses in cases of lack of appetite, bloating, and is recommended for heart-related pain.
2.	*Centaurium erythraea*	Flavonoids, bitter substances, derivatives of xanthone.	Whole plant.	It treats constipation and promotes liver function; in folk medicine, it is also used to treat jaundice.
			Hypericaceae	
1.	*Hypericum perforatum*	Tannins, flavonoids,	Stem, leaves, flowers.	Various skin impurities, rashes, wounds, bruises, varicose veins, digestive system, respiratory

		essential oil, resins, saponins, carotene, vitamin C, nicotinic acid, choline, traces of alkaloids.		system, reproductive system of women and men, nervous system, endocrine system.
Iridaceae				
1.	*Crocus vernus*	Proteins, lipids, essential oils, pectin, and cellulose.	Bulbs.	The bulb is edible as a vegetable, it is a honey plant, and due to its early flowering, it is one of the first sources of forage for bees.
Lamiaceae				
1.	*Ajuga reptans*	Iridoid glycosides, diterpenoid glycosides.	Young leaves and shoots.	It is useful for treating coughs and liver diseases.
2.	*Betonica officinalis*	Alkaloids (betonicin, stachidrin, trigonelin), tannins.	Whole plant	Strengthening the nerves in cases of epilepsy, jaundice, asthma, heartburn, rheumatic diseases, gout, gastric catarrh, vomiting, and poisoning.
3.	*Mentha piperita*	Essential oil of menthol, carotene, betaine, organic acids, Zn, Se, Mb, Sr.	Leaves and whole plant.	It alleviates pain, soothes cramps, bloating, and diarrhea, promotes better digestion of food, calms nausea and irritation during vomiting, and has antiseptic effects, as well as helping with difficulties in dysmenorrhea.
4.	*Melissa officinalis*	Essential oil (citral, geraniol), vitamin C, carotene, tannins.	Whole plant	It soothes the nerves, strengthens, purifies the blood, uplifts the spirit, and dispels gloomy thoughts.
5.	*Prunella vulgaris*	Antioxidants, essential oils, pentacyclictriterpenes, tannins, beta-carotene and rutin, vitamins C, K, and B1.	Young leaves.	It has antiseptic, antibacterial, and antioxidant properties; it is used for mouth rinsing, as an ointment, or as tea for respiratory diseases.
6.	*Urtica dioica*	Proteins, carbohydrates, fats, Ca, P, Fe, vitamins C, A, B2, and K, carotene.	Whole plant.	The root helps with prostate diseases, the leaves with urinary tract, kidney, female genital organ diseases, and hemorrhoids. The seeds are used to improve the overall condition of the body.
7.	*Teucrium montanum*	Essential oil, choline, heteroside, tannin, saponin, and bitter substances.	Above-ground part of the plant.	Digestive and respiratory system and for recovery of the body, for strengthening the immune system, stress, diseases of the mouth and throat, various infections, fungi, and ulcers.
8.	*Thymus serpyllum*	Essential oil (phenols - thymol, carvacrol), flavonoids, organic acids, tannins, saponins.	Above-ground part of the plant.	Antiseptic for internal organs, respiratory organs, and urogenital organs, neuroses, depression, diuretic, as a good disinfectant in the treatment of skin diseases, and for oral infections.
9.	*Marrubiumvulgare*	Essential oil, tannin, bitter substances.	Above-ground part of the plant.	It is used for lack of appetite, digestive difficulties, and disorders of bile secretion.
10.	*Glechoma hederacea*	Choline, essential oil, saponins, tannins, resins, acetic acid, and	Above-ground part of the plant.	It is used primarily for the treatment of lung diseases and respiratory organs, as well as diarrhea, hemorrhoids, and gastritis. Poultices are used for treating injuries and wounds.

		tartaric acid.		
11.	*Salvia officinalis*	Vitamin C and A, niacin, thiamine, riboflavin, Cu, Zn, Mg.	Leaves.	It has antiseptic properties: it helps with purulent and inflamed throat and gums.
12.	*Origanum vulgare*	Essential oil, flavonoids, tannins, ascorbic acid.	Leaves and terminal flowers.	It is used for respiratory tract infections, fungal infections, and cystitis.
			Malvaceae	
1.	*Malva sylvestris*	Vitamin C, carotene, Fe, and Ca.	Leaf, flower, and root.	Inflammation of the gastric and intestinal mucosa, throat and esophagus, bladder diseases, skin diseases, eye diseases, ear pain, and in the treatment of women's diseases.
			Pinaceae	
1.	*Abies alba*	Vitamin C and A, turpentine, essential oil, bornyl acetate, pinene, and limonene.	Young needles and resin.	In inhalations for respiratory issues or local treatment for painful muscles.
2.	*Pinus sylvestris*	Essential oil, pinene, vitamin C, bitter substances, resins, proteins, oil, carotene.	Younger shoots and needles, seeds although they are very small, the inner part of the bark, and boiled buds.	Treatment of the respiratory tract, hoarseness, cough, mild bronchitis, treatment of asthma, rheumatic diseases, and gout. The resin can be used for cramps caused by gallstones.
			Plantaginaceae	
1.	*Digitalis grandiflora*	Digitalin	Flower	It is used in the pharmaceutical industry as a medication for heart problems.
2.	*Plantago major*	Glycosides, saponins, and bitter substances, sugar, essential oil, chlorophyll, xylin, vitamins A, C, and K, Fe, Ca, phosphoric acid.	Leaf and roots.	Cleanses and stops bleeding, strengthens the stomach, expels mucus or catarrh, and heals wounds. It is used in the treatment of respiratory organs, skin diseases, stomach and intestinal diseases, liver diseases, ear disorders, kidney and bladder diseases, and eye inflammation.
3.	*Plantago lanceolata*	Flavonoids, phenolic acids, organic acids, tannins, phytoncides, mucus, sugar, vitamin C.	Seeds, flower heads, and roots.	Infections and painful skin conditions, blisters, calluses, ulcers, insect bites, deafness, eye diseases, high blood fat, fevers and febrile states, inflammatory conditions of mucous membranes, various bleeding, skin diseases, liver and bile diseases, women's diseases, toothache, kidneys and bladder.
4.	*Veronica officinalis*	Glycosides, saponins, bitter substances, a small amount of essential oil, organic acids, sugars, wax.	The above-ground part of the plant in flower.	Used for lung problems, gout, rheumatism, eczema, and other skin diseases.
5.	*Veronica chamaedrys*	Glycosides, bitter substances, a small amount of essential oil.	The above-ground part of the plant in bloom.	The leaves are edible and can also be used as an additive to teas with milder effects on illnesses than the medicinal common plantain.
			Polygonaceae	
1.	*Rumex crispus*	Vitamin C and	Above-ground part	Used for treatment against diarrhea.

		carotene.	of the plant.	
Polypodiaceae				
1.	*Polypodiumvulgare*	Essential oil, tannins, alkaloids, saponins.	The tuber and root of the plant.	Sweet fern treats the lungs, early tuberculosis, liver diseases, ailments in the gallbladder, swollen spleen, hoarseness, catarrh, cough, asthma, and softens mucus.
Primulaceae				
1.	*Lysimachia nummularia*	Tannins, ascorbic acid, saponins, arginine.	Above-ground part of the plant.	The young leaves and flowers are edible and can also be used as tea for treating kidney stones.
2.	*Primula vulgaris*	Vitamin C, carotene, and saponin.	Flowers, leaves, and roots are collected,	Flowers, root, and rhizome are edible, and when prepared as tea, they help soothe coughs.
3.	*Primula veris subsp. columnae*	Essential oil, primaverin glycoside, saponin.	Root and flower.	It is used in folk medicine and the pharmaceutical industry; young leaves are used as food, serving as a vitamin-rich vegetable.
Rosaceae				
1.	*Aruncus dioicus*	Antioxidants.	Young shoots and roots.	Alleviating postpartum bleeding, reducing urinary system issues, treating abdominal pain, diarrhea, gonorrhea, fevers, internal bleeding, rheumatoid joints, and swollen legs.
2.	*Crataegus monogyna*	Flavonoids, oligomericprocyanidins, C-glycosides, triterpenes, and biogenic amines.	Leaf and flower.	It is used for digestive issues in children, as well as for poor circulation, arrhythmia, and to normalize blood pressure.
3.	*Filipendula hexapetala*	Vitamin C and carotene.	Leaf, bulb and flower.	Young spring leaves can be used as a salad, and later only as cooked vegetables.
4.	*Fragaria vesca*	Tannin, mucilage, organic acids, a lot of vitamin C, sugar, fruit acids.	Leaves, the aerial part of a non-flowering plant, and rhizome.	Against diarrhea, purifies the blood, stimulates the function of all organs, especially the kidneys, calms nerve tension, and promotes the healing of minor wounds.
5.	*Malus domestica*	Salicylic acid, pectins, wax, carotenoids.	Fruit.	In regulating bowel movements, it is recommended to eat an apple first thing in the morning on an empty stomach.
6.	*Rosa canina*	Proteins, flavonoids, pectin, essential oil, organic acids (citric and malic), sucrose, Fe, Mg, P, S, K, Ca, Na, beta-carotene, and high vitamin C content.	Fruit and flower petals.	For heart pain, for toothache, in cases of kidney and bladder diseases, in cases of tuberculous bleeding, bleeding from the stomach and intestines, for detoxifying the body, for cleansing the blood, in cases of gout and rheumatism, scurvy.
7.	*Prunusspinosa*	Tannins, organic acids, vitamin C.	Flowers, fruits, and bark from the roots.	Tea made from the flowers strengthens and purifies the blood, relaxes cramps, and acts as a purgative, which is why it is used in folk medicine for constipation.
8.	*Sorbusaucuparia*	Organic acids, vitamin C, and carotene.	Fruits.	The fruits are edible and are best harvested after the first frost.
9.	*Rubus idaeus*	Tannins, vitamins C and B, carotene, essential oil, flavonoids, coumarins,	Leaf and fruit.	Women's diseases, especially for clearing the fallopian tubes and infertility, treats diarrhea and dysentery, stops and purifies the blood, treats skin diseases and eliminates catarrh, alleviates intestinal inflammation.

		pectins.		
10.	*Rubus fruticosus*	Sugar, pectins, tannins, organic acids, carotene, vitamin C, B vitamins, potassium salts.	Roots, young leaves and shoots in spring, flowers during blooming, and fruits when they are green or ripe.	Due to the astringent tannins, they are used in the treatment of diarrhea and gum inflammation, and they have a milder effect compared to some other preparations (e.g., walnut leaves), making them suitable for use in children; they purify the blood and are beneficial in cases of anemia.
11.	*Crataegus oxyacantha*	Flavonoids, oligomericprocyanidins, C-glycosides, triterpenes, and biogenic amines.	Leaf and flower.	It is used for digestive issues in children, as well as for poor circulation, arrhythmia, and to normalize blood pressure.
12.	*Filipendulaulmaria*	Vitamin C and carotene.	Leaf, tuber, and inflorescence.	Young spring leaves can be used as a salad, and later only as cooked vegetables.
			Rubiaceae	
1.	*Asperula odorata*	Essential oil, tannins, alkaloids.	Above-ground part of the plant.	It regulates liver function, is effective for jaundice, calms migraines, and is also used for compresses on wounds.
2.	*Galiumverum*	Flavonoids, glycosides, essential oils, organic acids.	The upper part of the plant during flowering.	Tumors, epilepsy, hysterical seizures, urine excretion, inflammation of the liver, kidneys, and respiratory organs.
			Santalaceae	
1.	*Viscum album*	Lectin, polypeptides, flavonoids, lignin, biogenic amides.	Whole plant.	It is used to lower blood pressure, improve circulation, alleviate menstrual pain, and against dizziness.
			Scrophulariaceae	
1.	*Linaria vulgaris*	Tannin, yellow coloring matter, linarin, mucilage, proteins, sugar, salts.	The upper part of the plant with flowers.	Stomach ailments and urinary tract diseases, compresses for hemorrhoids, irrigation of purulent wounds, ulcers, and rashes.
			Violaceae	
1.	*Viola tricolor*	Flavonoids, essential oil, saponins, vitamin C, carotenoids, coumarins, mucilage, tannins, mineral substances.	Above-ground part of the plant.	It is used externally to treat various skin conditions, especially in children.
2.	*Viola odorata*	Alkaloids, gum, mucilage, and saponins.	Flower and rhizome.	It treats the respiratory organs, purifies the blood, and helps with kidney inflammation and bladder issues.

During this research, 109 medicinal plant species were identified, with a record of endangered and endemic species. The plants were classified into families, totaling 41 families, with the most represented being the Rosaceae and Lamiaceae families.

The root of Gentianalutea (yellow gentian) is ruthlessly harvested from Mount Konjuh, leading to its near extinction in areas known to be its habitat. *Gentianalutea* is characteristic of growing at higher altitudes, on southern exposures, and in sparse pine forests. During the study, locations were visited where the presence of *Gentianalute*a was expected; however, only a small number of individuals were observed. Upon returning to lower areas of Mount Konjuh with southern exposure, a large number of individuals of this species were surprisingly noted. This led to the conclusion that extensive exploitation has reduced the presence of *Gentianaluteaa*t higher altitudes due to human activity, while it was found that at

lower altitudes, where the presence of this species was not expected, the number of individuals had significantly increased, as there is no exploitation in those localities.

Teucriummontanum (mountain germander) was found at only one location near the MuškeVode hotel. This site is characterized by a significant amount of rocky substrate. An interesting fact is that at this location, mountain germander constituted about 60% of the vegetation, and it was largely accompanied by *Thymus serpyllum* (creeping thyme).

This information can be associated with the fact that in this area, wild medicinal herbs are harvested and sold. Therefore, it is essential to educate the local population about the importance of harvesting methods and the endangerment of certain plant species.

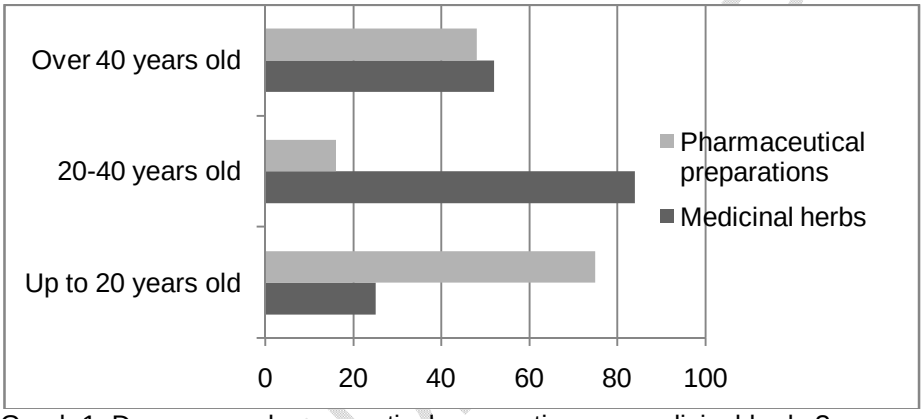
Common holly (*Ilex aquifolium)* belongs to the group of endangered and vulnerable plants. The number of specimens observed in the field was very small but significant, as it confirmed the presence of holly (*Ilex aquifolium)* on Mount Konjuh.

The presence of High cowslip (*Primulaveris subsp. columnae*) was also recorded, which falls into the category of endangered and vulnerable species.

The dominance of the Rosaceae and Lamiaceae families in the systematic spectrum of the investigated species indicates more arid habitats, and the influence of a warm climate with similar proportions of systematic affiliation has also been established in some other areas of Bosnia and Herzegovina (Leporatti ML., Ivancheva S. (2003), Bonet MA; Valles J. (2003), Leporatti ML., Ivancheva S. (2003).

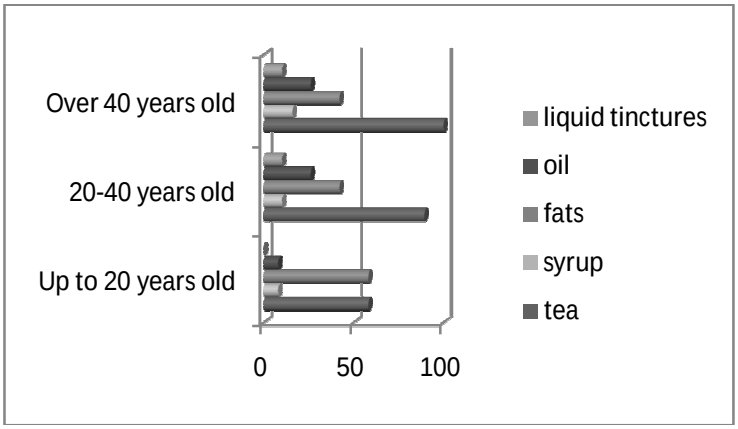
3.3 Poll

During the preparation of this paper, 50 individuals of different ages from the Mount Konjuh area were surveyed, representing three municipalities (Kladanj, Živinice, and Banovići).



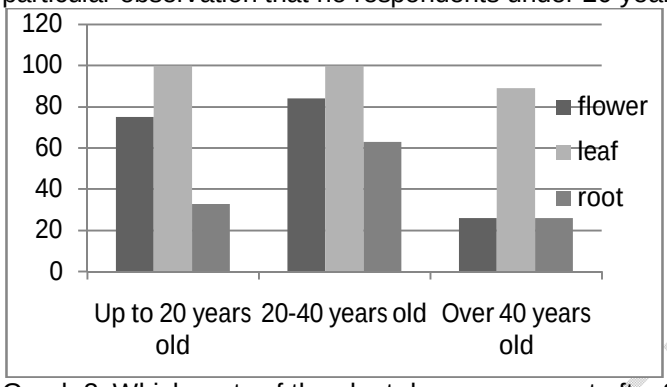
Graph 1. Do you use pharmaceutical preparations or medicinal herbs?

Based on the survey, we can determine that younger individuals (up to 20 years old) tend to use pharmaceutical preparations more in protecting their health, with 75% of respondents indicating this. In contrast, individuals of middle age (20-40 years old) are more likely to use medicinal herbs, with 84% of respondents reporting this. Among older respondents (over 40 years old), the use of medicinal herbs and pharmaceutical preparations is almost equal, with 52% of respondents using medicinal herbs and 48% using pharmaceutical preparations.



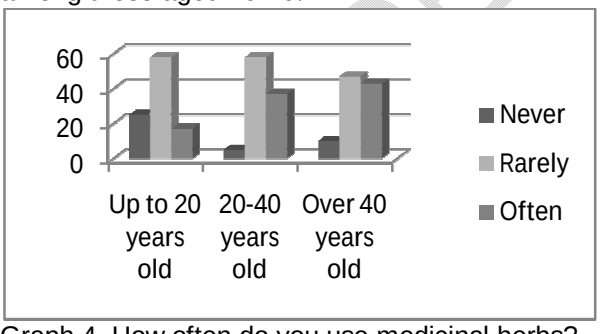
Graph 2. How do you use medicinal herbs?

Based on the method of using medicinal herbs, it is evident that the dominant form is the use of herbs in the form of teas, with a notable 100% of respondents over 40 years old using teas. The next most common method is the use of ointments, which are used by over 40% of all respondents. The least common method of use is in the form of tinctures, with the particular observation that no respondents under 20 years old reported using liquid tinctures.



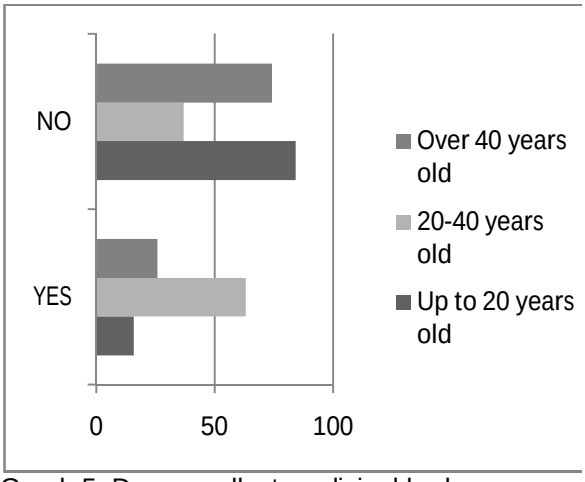
Graph 3. Which parts of the plant do you use most often?

The part of the plant most commonly used for medicinal purposes among all respondents is the leaf, where 100% of respondents aged 20 and under, as well as those aged 20-40, use leaves for medicinal herbs. This high percentage was determined through further investigation to be largely due to the extensive use of wild-collected mint. The flowers of plants are also widely used for medicinal purposes, especially among individuals aged 20 and under and those aged 20-40. However, among respondents over 40 years old, the percentage of flower use for medicinal purposes is somewhat lower, at 25% of respondents. The root is used the least for medicinal purposes, with significant use (63% of respondents) only among those aged 20-40.

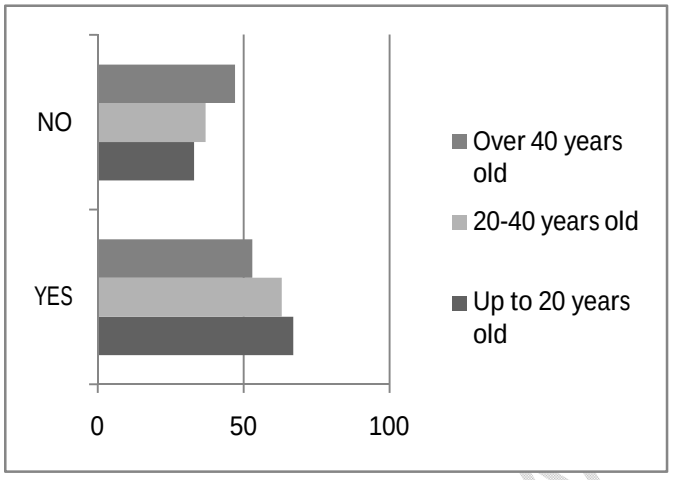


Graph 4. How often do you use medicinal herbs?

The majority of respondents from all age groups use medicinal herbs very rarely, accounting for about 50% of respondents. It is notable that individuals under 20 years old represent the highest percentage of those who never use medicinal herbs, with 25% of respondents, while this age group also has the lowest percentage of respondents who often use medicinal herbs, which is to be expected. The most frequent users of medicinal herbs are individuals over 40 years old, making up 43% of respondents.



Graph 5. Do you collect medicinal herbs yourself?



Graph 6. Do you often use medicinal herbs in the form of teas purchased from stores?

According to graphs 5 and 6, we conclude that individuals under 20 years old are the least likely to recognize medicinal herbs in nature, and therefore they most often use teas purchased from stores. The highest percentage of recognition of medicinal herbs in nature is among respondents aged 20 to 40, with 63% of respondents.

4. CONCLUSION

In order to conduct the research for this paper, a survey was carried out involving 50 respondents from the local population of Mount Konjuh. The results of the survey indicate that alternative medicine occupies a significant place in treatment methods; however, there is also a noticeable decline in knowledge about the use of medicinal herbs in Bosnia and Herzegovina, particularly among the younger population, which relies solely on the use of tea. There is a small number of practitioners of traditional healing methods, and the local population does not engage in this directly. Globalization has led to the frequent use of widely known non-native medicinal plants. These plants are increasingly cultivated for personal use or resale. On the other hand, significant indigenous sources of plant resources and methods of application have been forgotten.

The older segment of the population, respondents over 40 years old, uses medicinal herbs more frequently and in various forms, showing themselves to be the best knowledgeable about medicinal plants.

However, it is a disappointing fact that people living in the area of Mount Konjuh utilize the benefits of this mountain very little. In many cases, it is outsiders who benefit from the exploitation of the forest, medicinal herbs, mushrooms, etc.

The area of Mount Konjuh is characterized by a large number of medicinal plant species, so it is necessary to work towards sustainable development. The process of sustainable development for this area should be directed towards an ecologically acceptable method of resource management. Essentially, this means that medicinal herbs can be used to a degree that does not jeopardize the balance of the ecosystem.

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