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Medicinal Plants in Bermet, Serbian Aromatic Wine

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Abstract: Bermet is aromatic, dessert wine with especially unusual and original taste. Bermet is made exclusively from grapes from hillside vineyards of mountain Fruška Gora (Vojvodina, Serbia) and it is enriched with up to 26 aromatic, medicinal herbs. This rare wine is produced in limited quantities, only 15,000 to 20,000 bottles a year. This fact gives to the Bermet a special value and impressiveness. Nowadays, it is known that main medicinal plants included in Bermet production are: wormwood (*Artemisia absinthium*), yellow gentian (*Gentiana lutea*), anise (*Pimpinella anisum*), cinnamon (*Cinnamomum zeylanicum*), bitterbloom (*Centaureum umbellatum*), black mustard (*Brassica nigra* L), coriander (*Coriandrum sativum*), cloves (*Syzygium aromaticum*), carob (*Ceratonia siliqua*) and liquorice (*Glycyrrhiza glabra*). Besides these plants, orange and lemon peel, vanilla bars, dried figs and grape, as well as some quantities of nutmeg (*Myristica fragrans*), are added to Bermet. Pharmacological compounds from these plants have a powerful tonic, antioxidative, antiseptic, antidiarrheic and antipyretic effect. These plants are often used to remedy indigestion and gastric pain in Serbian folk medicine. They can be also used as a carminative and in regulation of the menstruation.

Bermet, as a valuable herbal medicinal beverage, demonstrates the complementary effect of phenolic compounds from red wine and numerous pharmacological compounds from medicinal and aromatic plants added during its production. The aim of this paper was to emphasize the individual effect of these plants, in order to evaluate their contribution to the medicinal value of this aromatic wine.

Keywords: Bermet; Serbia; Wine; Medicinal plants; Pharmacological compounds

Introduction

There is no doubt that wine is a healthful beverage. Wine has been consumed through ages as food and as a food adjunct. Until only recently, there was no hard experimental evidence to substantiate the claims that wine consuming contribute to health (Zoecklein *et al.* 1995). Rigorous epidemiological studies conducted in many developed countries have shown that although French diet includes high consumption of cholesterol-laden foods (meat, cheese, butter) they have lower rates of cardiovascular disease and death than people in other countries. This was described to the fact that French diet normally includes moderate consumption of red wine. This term was called “The French Paradox” (Renaud and de Lorgeril 1992). These positive physiological effects primarily exhibit certain compounds from the group of polyphenols, named “proanthocyanidols” (Keli *et al.* 1996). Grapes and wine contain a great number of different phenolic compounds which have antioxidant function such as: salicylic, benzoic and gallic acid, hydroxybenzoic acids, catechin, epicatechin, quercetin, as well as the grape pigments (anthocyanins) (Hollman *et al.* 1996, Campodoncio *et al.* 1998). Proanthocyanidols from wine may prevent formation of gizzard ulcer, reduce the cholesterol content in blood. Furthermore, some of these compounds have proven antipyretic, antiviral, antibacterial and analgesic properties (Masquelier *et al.* 1979, Gavinnnet-Jeannin *et al.* 1988, Zoecklein *et al.* 1995). Bermet is aromatic, dessert wine made from grapes from vineyards of mountain Fruška Gora (Vojvodina, Serbia), enriched with up to 26 aromatic, medicinal herbs which are responsible for its original taste. This includes plants such as wormwood (*Artemisia absinthium*), yellow gentian (*Gentiana lutea*), anise (*Pimpinella anisum*), cinnamon (*Cinnamomum zeylanicum*), bitterbloom (*Centaureum umbellatum*), black mustard (*Brassica nigra* L), coriander (*Coriandrum sativum*), cloves (*Syzygium aromaticum*), carob (*Ceratonia siliqua*) etc. As already mentioned, red wine has a plenty of positive effects on human health, but the addition of these medicinal and aromatic plants makes it even more valuable due to numerous pharmacological compounds extracted during the production process. Technology of Bermet production is passed down from generation to generation and its recipe was kept as a closely guarded secret. For this reason, the available literature about this aromatic wine is very poor. As a first step in the research connected with Bermet, the aim of this ethno-pharmacological study is to emphasize the importance of these medicinal plants and their therapeutic uses in Serbian folk medicine in order to present the overall value of this unique wine.

Materials and Methods

For the production of Bermet, according to one recipe, we need the following main ingredients: 100 g of wormwood, 60 g of yellow gentian, 35 g of anise, 15 g of cinnamon, 80 g of bitterbloom, 60 g of black mustard, 8 g of

coriander, 5 g of cloves, 8 g of carob, 5 g of liquorice, 2-3 bars of vanilla, 6 g of orange peels, 6 g of lemon peels, 0.5 kg of dried figs, 0.5 kg of raisins and 4 kg of partially caramelized sugar. These ingredients are added into 5 L of hot water and leave to stand for one day. This step is followed by addition of 6.5 L of 96% v/v of ethanol and the maceration of the mixture is conducted during 7 days, with occasional stirring. Then, after the plants are separated, 1-2 L of obtained macerate is added to 100 L of red wine. Bermet is ready for use after 2-3 months of aging.

The main part of data is from bibliographical sources but it also includes information gathered through field researches. For this reason, this type of research includes consultations with selected knowledgeable elders (Cotton 1996). For each used species in the described recipe the following details are included: scientific and vernacular name, therapeutic properties, used part, preparation and eventual additional note. Most of the documented plants are involved in the preparation of folk cure of more than one disease. Many of these plants are not strictly related to the area of Serbia since they could be found as wild or cultivated plants in other countries. However, it is known that the chemical composition of plants in active compounds may differ with their geographic origin due to ecological (e.g., climatic conditions) and evolutionary-historic reasons. Hence, it is not surprising that the folkloric use of plants vary among geographic regions (Šarić-Kundalić *et al.* 2010).

Results and Discussion

One of the main ingredients of this aromatic wine is wormwood (*Artemisia absinthium*), a medicinal aromatic-bitter herb widely used in Serbian folk medicine. Herbaceous aboveground part of the plant (*Absinthii herba*) is used. It contains up to 0.4% of bitter compounds mainly from the group of sesquiterpene lactones (absinthin, artabsin, anabsitin ...). Essential oils (0.2-0.8%) of wormwood contain thujone (toxic in larger amounts), iso-thujone, thujyl alcohol etc. Wormwood extract is rich in numerous flavonoids. Traditionally, it is used to treat troubles of gastrointestinal tract, where improves digestion, increases appetite as well as eases cramps in the stomach and intestines. It is important to emphasize its use in improvement of blood capillary vessel circulation and in regulation of the menstruation (emmenagogue effect). It has also been used as natural antioxidant, antidiarrhetic, anthelmintic, choleric, antiseptic, depurative, diuretic and in treating leukemia and sclerosis (Savez farmaceutskih društava Jugoslavije 1989, Lee *et al.* 1992, Kerkeš 2004, Čanadanović-Brunet *et al.* 2005, Nikićević and Tešević 2009).

Yellow gentian (*Gentiana lutea*) is a herbal species with a long-term use in traditional medicine due to its well-known digestive and stomachic properties. It is a perennial herbaceous plant, with thick-branched roots and characteristic yellow flower. It is a typical mountainous plant which can be found on the mountain passes and pastures (such as south Serbia) (Savez farmaceutskih

društava Jugoslavije 1989, Nikićević and Tešević 2009). The most valuable part of the plant is root. As a storage organ it is mainly consist of soluble carbohydrates (mainly gentianose and sucrose) and, in smaller quantities, polyphenols, essential oils and the bitter secoiridoids (amarogentin, gentiopicroside and swertiamarin), that give gentian its characteristic bitter taste (Mihajlov and Tucakov 1972, Ariño *et al.* 1997, Kostić 2004). It exhibit considerable antioxidant properties (Kusšar *et al.* 2006). Apart from the fact that the use of yellow gentian improves digestion, increases appetite, it has a beneficial effect in the treatment of diseases of the liver and biliary tract. It is also recommended for painful inflammation of the veins, internally or externally for cladding. It is important to emphasize that its bitter substances are not toxic (like thujone, for example) (Nikićević and Tešević 2009).

Another important plant for this wine is anise (*Pimpinella anisum*). It is an annual, herbaceous herb with white flowers and small green to yellow seeds, which grows in warm regions of the world, especially in Balkans and east Mediterranean. Seeds are part of the plant with aromatic and medicinal properties. The seed contains 1.5-5% of essential oils whose main ingredient and taste and smell holder is trans-anethole (80-90%). Other major compounds are methylchavicol, anisaldehyde, estragole, eugenol, coumarins, polyenes etc. It is beleived that anise has several therapeutic effects on conditions such as digestive, gynaecologic, neurologic, and respiratory disorders. Its use improves digestion, helps with stomach cramps and gases. In some parts of Serbia it is believed that its use improves the secretion of milk and menstruation in women (Savez farmaceutskih društava Jugoslavije 1989, Kerkeš 2004, Nikićević and Tešević 2009). Anise extracts possess noticeable antioxidant and antimicrobial activity (Gülçin *et al.* 2003). Eugenol and estragole have anaesthetic, hypothermic, muscle relaxant activities (Boskabady *et al.* 2001).

Cinnamon (*Cinnamomum zeylanicum*) is a plant characteristic for tropic regions of Asia and in Serbia is imported in the form of cinnamon bark or powder. It contains 1-2% of essential oils, whose main ingredient is cinnamaldehyde (65-75%) (Kerkeš 2004). The use of this herb can improve glucose metabolism and the overall condition of individuals with diabetes not only by hypoglycemic effects but also by improving lipid metabolism, antioxidant status, and capillary function (Khan *et al.* 2003). A water-soluble polyphenol typ-A polymer from cinnamon has been isolated and shown in vitro to have insulin-like activity. It has been shown to reduce total and LDL-cholesterol concentrations (Hlebowicz *et al.* 2007). It is also used as a good antidiarrhetic, hemostatic and stomachic (Savez farmaceutskih društava Jugoslavije 1989). In Serbian folk medicine it is also used in cases of prolonged, intensive menstruation and after childbirth. It strengthens the heart and stomach (Kerkeš 2004).

Bitterbloom (*Centaureum umbellatum*), also known as centaury, is an annual herbaceous plant with small red flowers. It can be found in moist mountain meadows and alight forests. The most important compounds isolated from this herb are bitter glycoside eritrocentaurin, secoiridoids (gentiopicrin,

centapicrin, swertiamarin), alkaloids (gentianine, gentianidine, gentioflavine), phenolic acids, triterpenes and xanthone derivatives. It is believed that the use of this herb purifies the blood, strengthens digestive function, increases stomach secretions, stimulates the appetite, help with heartburn and increases bile production. It is also used to strengthen the bladder, help with gout, when a digestive or gastric stimulant is needed (gas, bloating, cramps etc.) (Savez farmaceutskih društava Jugoslavije 1989, Kerkeš 2004, Nikićević and Tešević 2009).

Black mustard (*Brassica nigra* L) is hardy annual, wild or cultivated, herbaceous plant with characteristic yellow flowers. The fruit is a flattened spherical shell with tiny scarlet seeds which possess numerous medicinal properties (Savez farmaceutskih društava Jugoslavije 1989, Kerkeš 2004). This herb contains glucosinolates (sulphur glucosides), valuable ingredients believed to have antifungal, antibacterial, antioxidant, antimutagen, anticancer effects (Kopjar et al. 2012). The most important glucosinolate from black mustard is sinigrin. It is also used for the relief of rheumatic or neuralgic symptoms (Kerkeš 2004). Main application is externally, as a poultice or for rubbing.

Coriander (*Coriandrum sativum*) is an annual, wild or cultivated, branched herbaceous plant with unpleasant smell. After drying, seeds are getting pleasant, characteristic smell. Coriander contains essential oils (up to 1.4%), fatty oil (around 20%), proteins (around 18 %) etc. Essential oil is mainly consists of linalool (60-70%) while other terpenes (geraniol, borneol, limonene etc.) are present in smaller quantities. The use of coriander improves digestion, increases stomach secretions, stimulates the appetite, prevents bloating and increases bile production (Savez farmaceutskih društava Jugoslavije 1989, Kerkeš 2004, Nikićević and Tešević 2009). It has a significant hypolipidemic action. The levels of total cholesterol and triglycerides decreased significantly after the use of coriander seeds (Chithra and Leelamma 1997). In folk medicine recipes it is component of tea against haemorrhoids. Coriander is traditional anti-diabetic plant with insulin-releasing and insulin-like activity (Gray and Flatt 1999). Addition of coriander (extract from leaves and seeds) to food will increase the antioxidant content and may have potential as a natural antioxidant (Wangensteen *et al.* 2004).

Another important ingredient of this wine is cloves (*Syzygium aromaticum*). Cloves are the aromatic dried flower buds of a tree in the family Myrtaceae. They are harvested primarily in the south Asia countries, but they could be found all over the world where they are used as a spice. The content of essential oil in cloves may exceed 15%. The oil itself is dominated by eugenol (70 to 85%), eugenol acetate (15%) and β caryo-phyllene (5 to 12%). In folk medicine cloves oil is often recommended for skin care, especially to acne patients. It is also believed that their ingredients are useful in treating of a variety of health disorders including toothaches, indigestion, cough, asthma, headache, stress, and blood impurities. It has powerful local antiseptic and mild anesthetic actions (for oral use) (Savez farmaceutskih društava Jugoslavije 1989). They are also important antioxidants

(Niwano *et al.* 2011). One scientific study showed that cloves odors have positive effect on three cognitive skills - memory, affective reaction to the experiment and mood (Ludwigson and Rottman 1989).

Carob (*Ceratonia siliqua*) is native to the Mediterranean region including south Balkans. It contains larger amounts of polyphenolic compounds and vitamins A, B, B2, B3, and D (Avallone *et al.* 1997). It is mostly used as a spice. The tea of carob pods is a traditional medicine for coughs and sore throat (Kerkeš 2004). It is often used as a healthier substitute for chocolate (it has less fat than cocoa). It possesses antioxidant properties (Kumazawa *et al.* 2002). The group of researchers emphasized the lipid-lowering effect of carob and its potential use in treatment of hypercholesterolemia (Zunft *et al.* 2001).

Liquorice (*Glycyrrhiza glabra* L) is a bushy perennial plant with strong, branching root, violet flowers and pods as fruit. In Serbia, this plant is common for mountain Fruska gora. The part of plant used in medical purposes is root. The main ingredient in liquorice is glycyrrhizin (glycyrrhizic acid), is a triterpenoid saponin glycoside, which is 50 times sweeter than sugar. Besides this compound, it is important to emphasize larger amounts of flavonoids (likviricin *etc.*). Liquorice has beneficial applications in the medicinal and the confectionery sectors. It is recommended as a remedy for cough and as a powerful diuretic and stomachic (for gastritis and stomach ulcers). It possesses strong antioxidant and antiviral effect (Savez farmaceutskih društava Jugoslavije 1989, Kerkeš 2004). Glycyrrhizic acid is now routinely used throughout Japan for the treatment and control of chronic viral hepatitis (Shibata 2000). Excessive consumption of liquorice is known to be toxic to the liver and cardiovascular system, and may produce hypertension and edema (Olukoga and Donaldson 2000).

As already mentioned, Bermet recipes include addition up to 26 medicinal and aromatic plants and here we emphasised characteristics of the most important of them. Besides these plants, orange and lemon peel, vanilla bars, dried figs and grape, some quantities of nutmeg (*Myristica fragrans*) as well as some other, which are significant to a lesser extent, are added to Bermet. All of them contribute to the complex aroma of the wine.

Conclusions

As a result of this ethno-pharmacological study an insight into the importance of these medicinal plants and their therapeutic uses in Serbian folk medicine is provided. The complementary effect of phenolic compounds from red wine and numerous pharmacological compounds from medicinal and aromatic plants makes this wine even more valuable compared to the regular grape wine, regarding the importance for human health. The future research will include laboratory analyses of Bermet, in order to confirm, characterize and evaluate the facts presented in this ethno-pharmacological study.

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LEKOVITO BILJE U BERMETU, SRPSKOM AROMATIZOVANOM VINU

-originalni naučni rad-

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Rezime

Bermet je specijalno aromatizovano vino, neobičnog i originalanog ukusa, koje se pravi od grožđa iz vinograda sa padina Fruške gore (Vojvodina, Srbija) uz dodatak čak do 26 vrsta aromatičnih, lekovitih biljaka. Ovo retko vino se proizvodi u ograničenim količinama, samo 15000 do 20000 boca godišnje. Tačna receptura se čuva kao proizvođačka tajna, i kao takva se prenosi s generacije na generaciju. Ove činjenice daju bermetu posebnu vrednost i upečatljivost. Poznato je da su glavne lekovite biljke uključene u proizvodnju Bermeta: pelin (*Artemisia absinthium*), lincura (*Gentiana lutea*), anis (*Pimpinella anisum*), cimet (*Cinnamomum zeilanicum*), kičica (*Trifolium arvense*), crna gorušica (*Brassica nigra* L.), korijander (*Coriandrum sativum*), karanfilčići (*Sizigium aromaticum*), rogač (*Ceratonia silikua*) i sladić (*Glicirrhiza glabra*). Pored ovih biljaka, česti sastojci su i pomorandžina i limunova kora, štapići vanile, suvo grožđe i smokve, kao i određene količine muskatnih oraščića (*Miristica fragrans*). Farmakološki aktivna jedinjenja iz ovih biljaka ispoljavaju snažnu antioksidativnu aktivnost, a mnoga od njih mogu se ponašati i kao tonici, antiseptici, antidiuretici, antipiretici itd. U srpskoj narodnoj medicini ove biljke se često koriste u cilju poboljšanja varenja i protiv bolova u želucu. Mogu se takođe koristiti i kao sredstva protiv nadimanja i za regulisanje menstruacije.

Bermet, kao vredno lekovito piće na bazi bilja, pokazuje pozitivan komplementaran efekat između fenolnih jedinjenja iz crvenog vina i brojnih farmakološki aktivnih jedinjenja iz lekovitog i aromatičnog bilja koje se dodaje tokom proizvodnje. Cilj ovog rada je bio da se naglasi individualni efekat ovih biljaka, sve u cilju procene njihovog doprinosa medicinskoj vrednosti ovog aromatizovanog vina.