Available online on www.ijppr.com
International Journal of Pharmacognosy and Phytochemical Research 2016; 8(7); 1118-1120

ISSN: 0975-4873

Research Article

Fourier Transform Infrared Spectroscopy of Herbal Preparations Based on Rhizome with Roots of *Rubia tinctorum* L

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Available Online: 12th July, 2016

ABSTRACT
In the present study there were developed the methodic of qualitative analysis of phytopharmaceuticals preparations: "Rubia syrup", "Rubia decoction" and "Rubia water-alcohol extract" by means of Infrared spectrophotometry. As a result, more in-depth study of "Rubia syrup", "Rubia decoction" and "Rubia water-alcohol extract" conducted by fourier transform infrared spectroscopy to compare and qualitative analysis of phytopharmaceuticals preparations.

Keywords: *Rubia tinctorum* L., rhizome with roots, rubia syrup, rubia decoction, rubia water-alcohol extract, anthracenderivatives, ruberitrinic acid, fourier transform infrared spectroscopy (FTIR).

INTRODUCTION

In the seventeenth-eighteenth century rhizome with roots of *Rubia tinctorum* L. were cultivated in very large volumes in France, Holland, Bavaria, Belgium and used as a pigment of bright red color[1]. The rhizome with roots of *Rubia tinctorum* L. were used in textile industry for dyeing wool, silk and cotton fabrics[1,2]. At the end of the nineteenth century studied the nature of the coloring matters of *Rubia tinctorum* L., the natural dyes were replaced by synthetic alizarin and its derivatives. In the present time rhizome with roots of *Rubia tinctorum* L. used as diuretic, antispasmodic and kidney stones destroyer properties. The pharmacopoeial raw material are rhizomes and radices containing significant quantities of anthracene derivatives[1] (2.5-3,0%), which are responsible for the pharmacological action of the preparations[3-5]. Preparations of *Rubia tinctorum* L. have diuretic properties that increase the motility of the muscles of the renal pelvis and ureter, promotes stones[6]. Rhizomes and radices of *Rubia tinctorum* L. have the ability to loosen and destroy kidney stones and bladder, so the funds on the basis of raw materials used in urolithiasis[6]. During previous studies we isolated the active ingredients, set dominant components (ruberitrinic acid)[6] from rhizome with roots of *Rubia tinctorum* L. and developed a technological procedure for preparing of "Rubia syrup"[7,8]. At the present time there are no methods of qualitative analysis of these drugs on the basis of rhizome with roots of *Rubia tinctorum* L. by FTIR spectrophotometry. Fourier transform infrared spectroscopy (FTIR) is a fast and nondestructive analytical method. It is becoming a suitable technique for analysis of herbal medicine. This review focuses on the recent developments and updates for the qualitative analysis of herbal medicine using FTIR. Plants and plant products have been characterized by characteristic peaks in FTIR spectrum, indicating the presence or absence of functional groups and molecular skeleton, even from different geographical locations[1]. Purpose of research - to develop methods of qualitative analysis of drugs on the basis of rhizome with roots of *Rubia tinctorum* L.

MATERIALS AND METHODS

Materials

rhizome with roots of *Rubia tinctorum* L., made in March 2015, in the Krasnodar region. Electronic spectra were measured on the Infrared spectrophotometers " Nicolet iS5" (Thermo).

Decoction

Production of syrup in the laboratory began to produce a decoction of *Rubia tinctorum* L. rhizome with roots using ratios of "raw material - finished product"(1:8). The volume of extractant to produce a given volume of the finished product was determined taking into account the water absorption coefficient, which is 1 ml/g. Most of decoctions prepared pharmacopoeial method: a known amount of a certain amount of raw material filled with purified water at room temperature, heated in a boiling water bath for 30 minutes, cooled for 10 min, filtered and adjusted if necessary until the desired amount of the resulting ratio "raw material - the finished product"[9,10].

Syrup

Water extract of *Rubia tinctorum* L. rhizome with roots was used instead of purified water to obtain sugar syrups by means of pharmacopoeia method. To 36 g of this aqueous extracts were mixed with 64 g of refined sugar, and the mixture was heated until complete dissolution of sugars was adjusted to boiling twice, each time with

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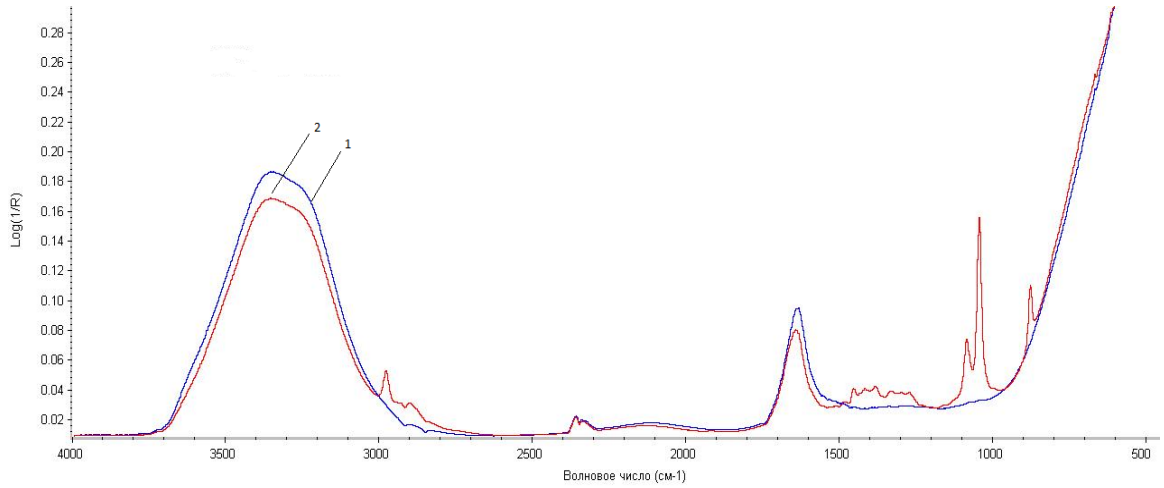

Figure 1: Infrared spectrum of Rubia decoction (1) and ruberitrinic acid (2).

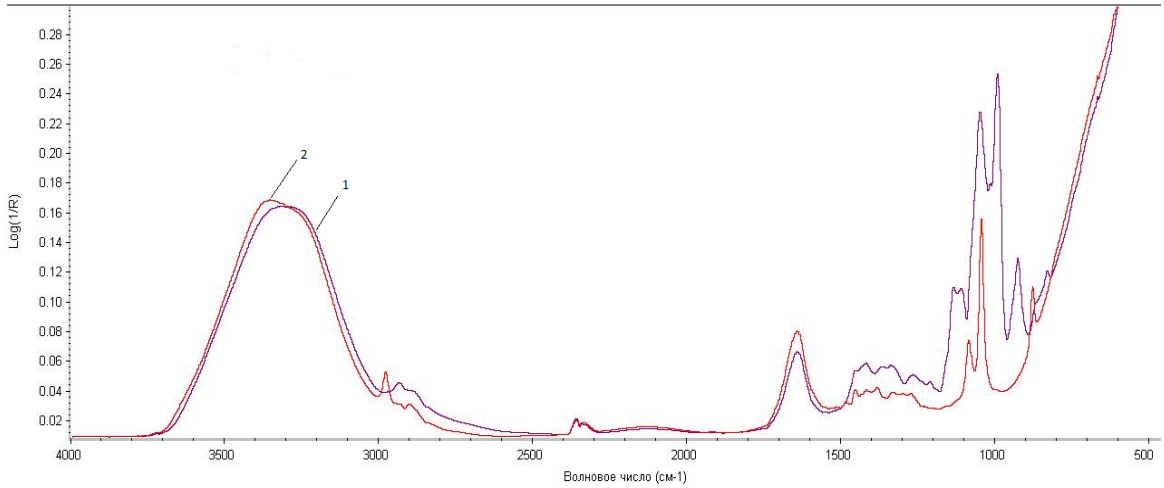

Figure 2: Infrared spectrum of Rubia syrup (1) and ruberitrinic acid (2).

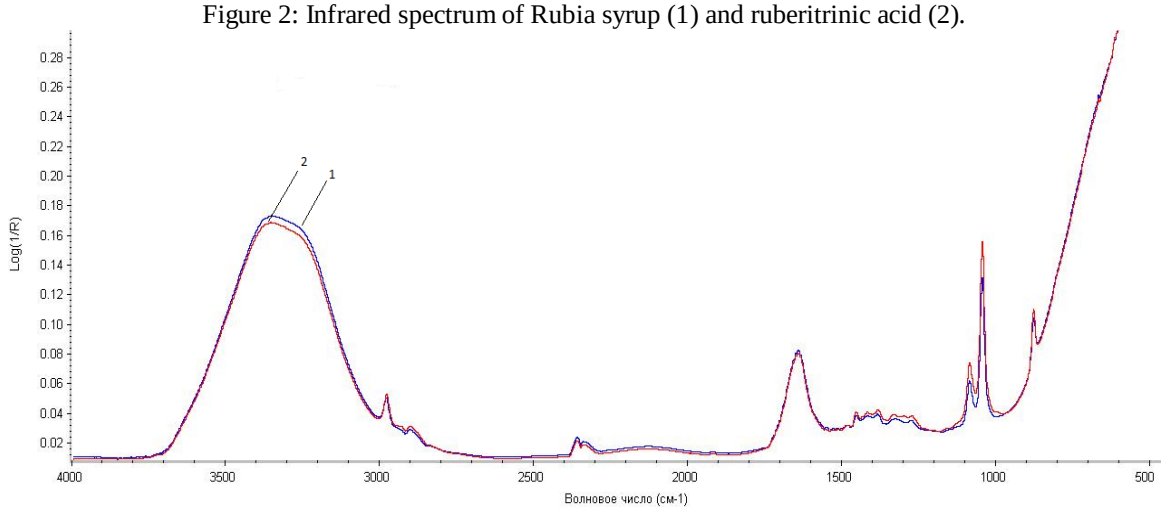

Figure 3: Infrared spectrum of Rubia water-alcohol extract (1) and ruberitrinic acid (2).

removing the resulting foam. Syrups filtered through cheesecloth into a hot, and adjusted to the initial weight of purified water[9,10].

Water-alcohol extract

Analytical sample species is crushed to the size of the particles passing through a sieve with apertures in diameter of about 1 mm. 1 g chopped species (precise linkage) is placed in a flask with a grinding capacity of 100 ml, add 30 ml of 80% ethyl alcohol. Closed the flask and weigh on calibrated scale accurate to ±0,01 g. Flask attached to reverse refrigerator and heated on a boiling water bath (moderate boiling) within 90 minutes. Then the flask close with the same tube, weighed again and fill in the missing extragent to the original mass. Removing filtered through paper filter («red» band) and cool for 30 minutes[8].

RESULTS AND DISCUSSION

The IR spectra of anthracenderivative ruberitrinic acid structure in which there are two carbonyl groups (C = O), found two distinct intense absorption bands in the 1625-1620 cm^{-1}. (Fig. 1-3). Intense absorption band in the IR spectra in the region of 3358 cm^{-1} due to the stretching vibrations of OH groups of the carbohydrate, which confirms the glycoside nature of the substance (Fig. 1-3). In the region 1400-1200 cm^{-1} IR spectra absorption bands were also observed, characteristic for phenolic compounds, including anthracenderivatives. In the region of 3100-3000 cm^{-1} IR spectra are also observed absorption bands due to stretching vibrations of aromatic CH = CH (Fig. 1-3). A comparative study of "Rubia syrup", "Rubia decoction" and "Rubia water-alcohol extract" by IR spectrometry confirmed that in the case of rhizome with roots of *Rubia tinctorum* L. diagnostic significance have the anthraglycoside - ruberitrinic acid, which is the dominant component of the raw material of the plant. In our opinion, the results of IR spectroscopy can be used for the purposes of standardization drugs test plants (see "Qualitative reaction"). Anthracenderivatives dominant in the rhizome with roots of *Rubia tinctorum* L. is ruberitrinic acid, which can then be used as a standard substance, and on the substance must be based in the qualitative and quantitative analysis.

REFERENCE

1. Kurkin V.A. Pharmacognosy: textbook for students of pharmaceutical faculties, Edn 2, Samara, 2007, 828-840.
2. Georgievsky V.P., Komisarenko N.F., Dmitruk S.E. Biologically active substances of medicinal plants. Nauka, Sibirskoe otd.: Novosibirsk, 1990, 235-250.
3. Asenov I., Nikolov S. Pharmacognosy. Sofia: Medicina i fizkultura, Russia, 1988, 154-158.
4. Plant Resources of the USSR. Moscow, 1988, 289-291.
5. Murav'eva D.A., Samylina I.A., Yakovlev G.P., Pharmacognosy. Moscow, 2002, 570-575.
6. Mashkovskiy M.D. Drugs. Moscow, 2012, 1216.
7. Shmygareva A.A., Kurkin V.A., Sankov A.N. Quantitative Determination of Total Anthracene Derivaties in Rubia Syrup Preparation. International Journal of Pharmacognosy and Phytochemical research 2016; 8 (2): 332-334.
8. Shmygareva A.A., Kurkin V.A., Sankov A.N. The Development of New Approaches of Standardization of Rubia tinctorum rhizomata et radices. International Journal of Pharmacognosy and Phytochemical research 2016; 8 (3): 415-418.
9. State Pharmacopoeia of the USSR. Edn 10, Moscow, 1986, 178-185.
10. State Pharmacopoeia of the USSR. Edn 11, Moscow, 1989, 258-267.