Available online on www.ijppr.com
International Journal of Pharmacognosy and Phytochemical Research 2016; 8(9); 1478-1480

ISSN: 0975-4873

Research Article

Fourier Transform Infrared Spectroscopy of Herbal Preparations Based on Leaves and Fruits of *Senna alexandrina* Mill.

Shmygareva A A[1*], Kurkin V A[2], Sankov A N[1]

[1]*Orenburg State Medical University, Department of Economics of Pharmacy, Pharmaceutical Technology and Pharmacognosy*
[2]*Samara State Medical University, Department of Pharmacognosy, Botany and Phytotherapy*

Available Online: 10th September, 2016

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

Keywords: *Senna alexandrina* Mill., leaves, fruits, senna syrup, senna thick extract, anthracenderivatives, sennoside B, fourier transform infrared spectroscopy (FTIR).

INTRODUCTION

Senna alexandrina Mill. – the medicinal plant that grows in India, Pakistan, the Sudan, as well as cultivated in the south of Ukraine and in the Krasnodar region[1,2]. On the territory of the Russian Federation, senna leaves are widely used as a source of laxative drugs. Despite the high degree of knowledge of *Senna alexandrina* chemical composition, remains contradictory information regarding the interpretation of the dominant components. For example, some studies indicated that the predominant substances are sennoside A, B, C and D[3] and elsewhere - kaempferol-3-O-gentiobioside[4], and in some literature – rhein[5]. Apparently, this circumstance is the reason for the fact that so far have not developed a unified approach to standardization of senna leaves, and in the existing approaches to the analysis did not fully use all the different chemical composition of Senna raw material. Previously, in order to substantiate methodological approaches to standardization of *Senna alexandrina* leaves a study on the allocation of raw materials of plant[6]. As a result of studying of the component composition of *Senna alexandrina* leaves isolated and characterized using ^{1}H-NMR, ^{13}C-NMR, UV spectroscopy and mass spectrometry test plants known to 8-O-β-D-glucopyranoside of torachrysone, kaempferol-3-O-gentiobioside and also anthracenderivative named as neorhein, which is a new natural compound and has a structure of 1,7-dihydroxy-3-carboxyanthraquinone[7]. However, the standardization of the plant is carried out by the sennosides, as it has been proven that the compound has a laxative effect. According to the State Pharmacopoeia XIII edition of the Russian Federation[8], the definition of the main groups of biologically active substances in FS.2.5.0038.15 "Senna leaves," spend the reaction of Borntrager, TLC with using a solution of standard sample of sennoside B and standard sample of barbaloin. In this regard, the use of additional methods of standardization of medicinal plants and preparations of *Senna alexandrina* is still relevant. IR spectroscopy is widely used for the identification of natural anthracenderivatives, establishing their structure, since each type of substitution in the anthraquinone structure characterized by a set of spectral characteristics. Purpose of research - to develop methods of qualitative analysis of drugs on the basis of leaves and fruits of *Senna alexandrina* Mill.

MATERIALS AND METHODS

Materials

The object of the study served as a thick syrup and the extract of the fruits and leaves of Senna alexandrina. For thick syrup and fruit extract used Senna alexandrina samples collected in the fruiting period (October, 2014) in India and industrial designs of Senna leaves (OAO "Krasnogorskleksredstva") (2014). Electronic spectra were measured on IR-spectrophotometer "Nicolet iS5" (Thermo). The evaporation was performed under vacuum using a rotary evaporator brand "IR-1 LT. Decoction: Production of syrup in the laboratory began to produce a decoction of *Senna alexandrina* Mill. leaves using ratios of "raw material - finished product"(1:3). The volume of extractant to produce a given volume of the finished product was determined taking into account the water absorption coefficient, which is 1.8 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

**Author for Correspondence*: *a.shmygareva@mail.ru*

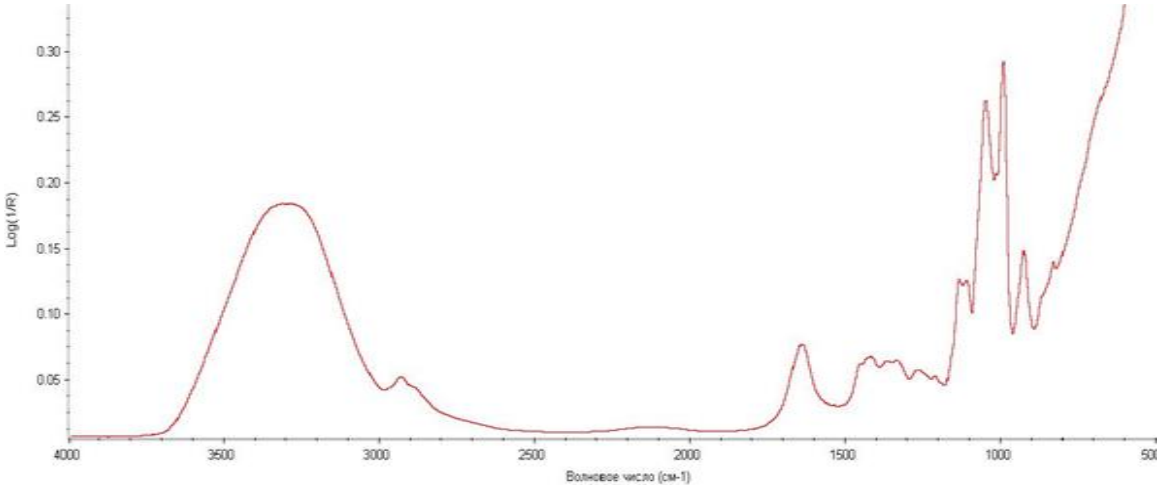

Figure 1. Infrared spectrum of Senna syrup

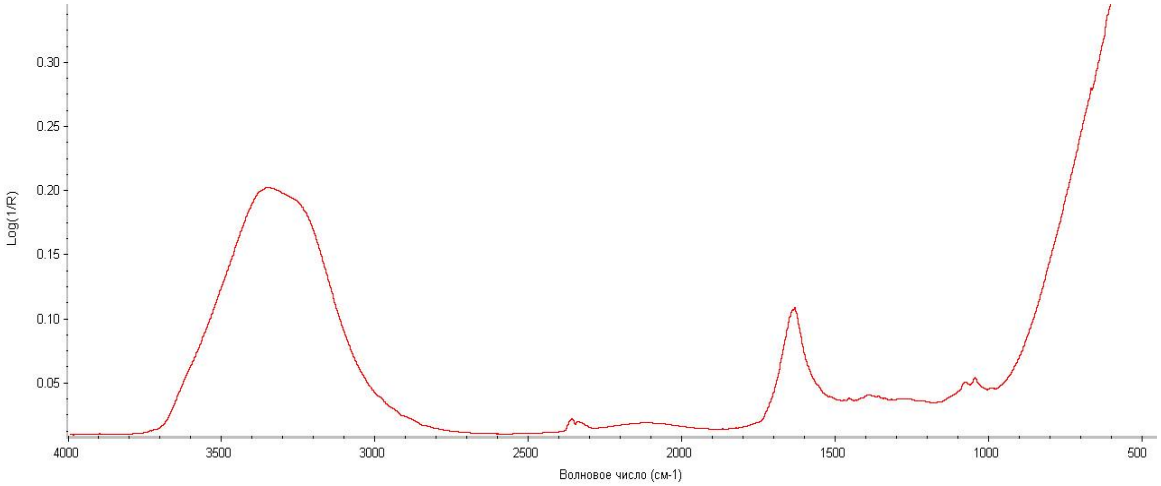

Figure 2: Infrared spectrum of Senna thick extract

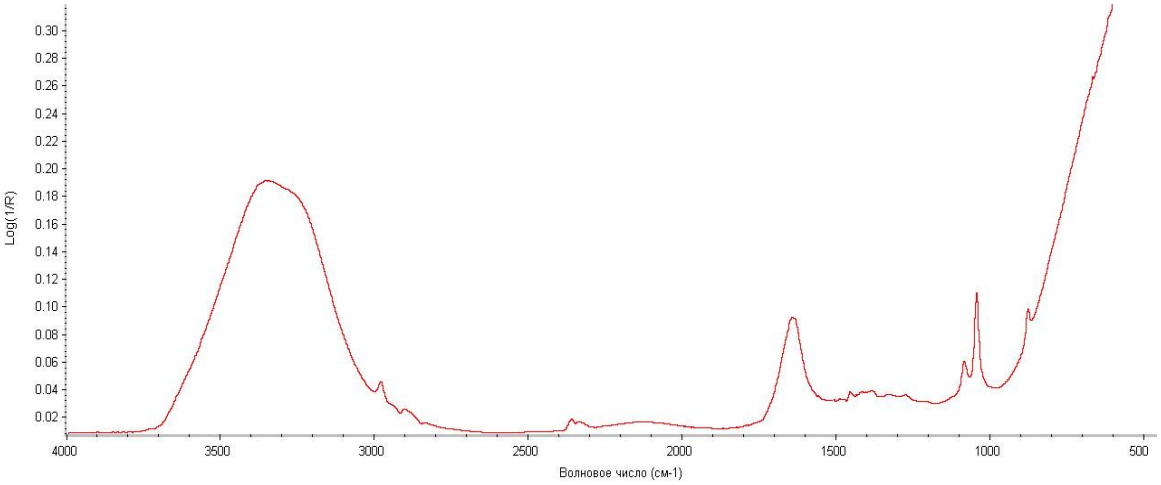

Figure 3: Infrared spectrum of Sennoside B

adjusted if necessary until the desired amount of the resulting ratio "raw material - the finished product"[9]. Syrup: Water extract of *Senna alexandrina* Mill. leaves were 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 removing the resulting foam. Syrups filtered through cheesecloth into a hot, and adjusted to the initial weight of purified water[9].

Thick extract

extract of *Senna alexandrina* Mill. fruits were performed by the method of percolation, using the ratio of "raw

material – extractant" 1:10. Extracts were dark, cloudy liquid, and a precipitate formed on standing. As extractant used ethyl alcohol 40 % (as showed advantages in pharmacological experiments). The resulting purified extract was evaporated under vacuum to distill the extractant by rotary evaporator model "IR-1LT" to obtain a thick extract from *Senna alexandrina* Mill. fruits with a moisture content of not more than 25%.

RESULTS AND DISCUSSION

The IR spectra of anthracenderivative sennoside B 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)[10]. 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)[10]. 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)[10]. A comparative study of the component composition of preparations on the basis of *Senna alexandrina* Mill. leaves and fruits by IR spectrometry confirmed that in the case of *Senna alexandrina* Mill. leaves diagnostic significance has the anthraglycosides - neorein and sennoside B, whereas in the case of *Senna alexandrina* Mill. fruits - anthraglycoside - sennoside B, which are the dominant components 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").

REFERENCE

1. Trease, Evans W.C. Pharmacognosy. 16th edition. Edinburgh, Saunders Elsevier, 2009, 280-281.
2. Bruneton J. Pharmacognosy, phytochemistry, medicinal plants, Paris, Lavoisier, 1995, 237-238.
3. Dave H., Ledwani L. A review on anthraquinones isolated from Cassia species and their applications. Indian Journal of Natural Products and Resources 2012; 3: 291-319.
4. Demirezer, L.O., Karahan N., Ucakturk E. et al. HPLC Fingerprinting of Sennosides in Laxative Drugs with Isolation of Standard Substances from Some Senna Leaves. Rec. Nat. Prod. 2011; 5: 261-270.
5. Aktar Md. W., Poi R., Bhattacharyya A. Status of sennosides content in various Indian herbal formulations: Method standardization by HPTLC. Bangladesh J. Pharmacol 2008; 3: 64-68.
6. Kurkin V.A., Shmygareva A.A. New approaches to standardization of senna leaves. Chemistry of vegetable raw materials 2016; 1: 71-77.
7. Kurkin V.A., Shmygareva A.A. Neorhein – new anthraquinone of CASSIA ACUTIFOLIA leaves. XV international scientific-practical conference. Moscow 2015; 6: 137-139.
8. State Pharmacopoeia of the Russian Federation, Moscow, 2015, 1294.
9. State Pharmacopoeia of the USSR. Edn 11, Moscow, 1989, 258-267.
10. Muzychkina R.A. Natural Anthraquinones. Biological properties and physicochemical characteristics, Ed. by G.A. Tolstikov. - Moscow: PHASIS, 1998, 836.