Development and validation of a TLC method for assessing the authenticity of Cinnamon bark

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Development and validation of TLC method for the identification of raw cinnamon

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SUMMARY

National quality standards for medicines should contain a section "Determination of the main groups of biologically active substances". This article proposes a technique that allows to distinguish the bark of Chinese cinnamon (Cinnamomum cassia (L.) C. Presl) from the bark of Ceylon cinnamon (Cinnamomum zeylanicum Blume) by chromatography in a thin layer of sorbent.

Key words: bark of Chinese cinnamon, bark of Ceylon cinnamon, phenolic compounds, identification of authenticity, chromatography in a thin layer of sorbent.

RESUME

National standards for the quality of medicines should contain a section "Identification". In this article a method is proposed to distinguish the bark Cinnamomum cassia (L.) C. Presl from the bark Cinnamomum zeylanicum Blume by thin layer chromatography in the sorbent.

Keywords: Cinnamomum cassia (L.) C. Presl, Cinnamomum zeylanicum Blume, identification, thin-layer chromatography method.

Introduction

Currently, the search for additional sources of medicinal plant materials is relevant. Food plants as possible sources of medicinal plant materials for further introduction into pharmaceutical practice are considered the most promising [2, 4]. The bark of cinnamon (cinnamon) is widely used as a food plant (spice) in various countries. In addition, monographs on Ceylon cinnamon bark are presented in leading foreign pharmacopoeias: European [7], British [5], Spanish [9] and Ukrainian [1], and monographs on Chinese cinnamon bark are given in Japanese [11] and Chinese [8] pharmacopoeias. Earlier, the Russian Pharmacopoeia of the VI edition included an article on Chinese cinnamon bark [3].

According to GOST 29049-91 “Spices. Cinnamon. Specifications ”Cinnamon bark can be produced from 4 types of cinnamon, including C. zeylanicum and C. cassia, which can be distinguished by the appearance of the whole raw material. It is not possible to identify from which type of cinnamon tree the cinnamon bark is harvested, if it is in the form of a powder, by external signs.

The purpose of this work is to develop a TLC method that allows

to distinguish the bark of Chinese cinnamon from the bark of Ceylon cinnamon.

Materials and methods

The objects of research were industrial series of cinnamon bark meeting the requirements of GOST 29049-91 “Spices. Cinnamon. Technical conditions ". The bark of Chinese cinnamon is sticks, not peeled from the outer layer, no more than 5 mm thick, at least 10 cm long, and the bark of Ceylon cinnamon is sticks in the form of rolled tubes, smooth, peeled from the outer layer no more than 3 mm thick, at least 10 cm.

Chromatography in a thin layer of sorbent was performed on TLC Silica gel 60 F254 Aluminum sheets (MERCK, Germany). The extraction of biologically active substances from raw materials was carried out according to the method described in the European, Japanese and Spanish pharmacopoeias [7, 9, 11] for the bark of Ceylon cinnamon: about 0.1 g of raw material, crushed to a particle size passing through a sieve with holes of 0.5 mm, placed in a flask with a thin section with a capacity of 100 ml, add 2 ml of methylene chloride and shaken for 15 minutes, then the extraction was filtered through a paper filter and evaporated to dryness in a water bath. The dry residue was dissolved in 0.4 ml of toluene.

When developing the technique, the optimal separation conditions were selected, including the analysis of the mobile phases used in the analysis of raw materials containing lipophilic compounds [6, 10].

Solutions of standard samples of eugenol and trans-cinnamaldehyde were used as reference solutions.

Research results and their discussion

The studies carried out made it possible to establish that the best separation of lipophilic compounds of cinnamon raw materials, which makes it possible to distinguish the bark of Chinese cinnamon from the bark of Ceylon cinnamon, was achieved in the toluene - anhydrous formic acid system (10: 0.3).

After the solvent front had passed a distance of 8 cm from the start line, the plate was removed from the chamber, dried to remove traces of solvents under a draft (at room temperature), and viewed at 254 nm.

On the chromatogram of a solution of standard samples of eugenol and transcinnamic aldehyde, 2 zones were found: a brown zone with R_f about 0.27 (trans-cinnamaldehyde), taken as R_s= 1.0, and also a zone with R_s (in terms of trans-cinnamaldehyde) about 1.35 (eugenol).

On the chromatogram of extraction from the bark of Chinese cinnamon and from the bark of Ceylon cinnamon, 5 zones of brown with R_s (based on trans-cinnamaldehyde) about 0.15, 0.55, 0.8, 1.0 and 1.35. Other zones are possible.

It is not possible to distinguish 2 types of cinnamon bark according to the results obtained.

However, after viewing the chromatogram at 365 nm, the chromatogram of the extract from the Chinese cinnamon bark was found: two zones of blue color with R_s (based on trans-cinnamaldehyde) about 0.15 and 0.7, one green zone with R_s about 0.3 and one blue zone with R_s about 0.5. Other zones are possible.

On the chromatogram of the extract from the bark of Ceylon cinnamon, two zones of red color with R_s (based on trans-cinnamaldehyde) about 0.1 and 0.2, one green zone with R_s about 0.3 and one blue zone with R_s about 0.7. Other zones are possible.

Chromatographic characteristics for the bark of Chinese cinnamon and Ceylon cinnamon bark differ when viewed at 365 nm and allow the identification of the raw material.

The developed technique was validated according to the specificity and suitability of the chromatographic system. The specificity of the method was assessed by the coincidence of the chromatographic profiles of different batches of raw materials, by the main zones with each other and their correspondence to the description of the method. The number of tested batches of raw materials was at least 3. Chromatographic profiles of different batches coincided in the main zones with each other and corresponded to the description of the methods.

As an indicator of the suitability of the chromatographic system, we chose the resolution between the zones of standard samples of eugenol and trans-cinnamaldehyde with R_s about 1.35 and R_s about 1.0, respectively.

The resolution between the indicated zones was calculated by the formula: $R = 2 (t_{R2} - t_{R1}) / W_{b1} + W_{b2}$where t_{R1} Is the distance from the start line to the middle of the zone of trans-cinnamic aldehyde with R_s about 1.0 mm; t_{R2} - distance from the start line to the middle of the eugenol zone with R_s about 1.35 mm; W_{b1}, W_{b2} - the distance between the upper and lower boundaries of each of the indicated zones (width of the zones), mm.

The resolution value between the indicated zones was at least 1.5.

conclusions

1. A method for the determination of lipophilic compounds in raw cinnamon by TLC.

2. Based on the research installed chromatographic characteristics to distinguish the bark of Chinese cinnamon from the bark of Ceylon cinnamon.

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