CHEMICAL ANALYSIS AND ANTIOXIDANT ACTIVITY OF SOME ROOIBOS TEA PRODUCTS

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Abstract

The Rooibos tea, known as well as red tea, has lately gain attention due to its reported rich antioxidant composition. The aim of this research was to determine the polyphenol content and antioxidant capacity of 6 commercial types of Rooibos tea available on the Romanian market. The analyses of polyphenolic compounds were carried out using chromatographic and spectrophotometric methods. The total polyphenol content (TPC) was assessed by the Folin-Ciocâlteu method and some polyphenols were identified by HPLC: ferulic, sinapic acids, hyperoside, isoquercitrin, rutin, quercitrin, quercetin, luteolin, kaempferol etc. The results showed qualitative and quantitative differences between the samples. The evaluation of antioxidant capacity was performed using DPPH (α,α-diphenyl-β-picrylhydrazyl) and FRAP (ferric reducing antioxidant power) methods, and a moderate activity has been highlighted for all the analysed samples.

Keywords: Aspalathus linearis, Rooibos, polyphenols, antioxidant capacity

Introduction

Aspalathus linearis (Fabaceae family) is a plant species from South Africa which grows annually, spontaneous in a limited region of the Cederberg Mountains [6]. The plant exists in different ecotypes, the most common being the shrub [5]. The plant is utilized in traditional medicine as a relaxing drink due to its caffeine free and low tannin composition [6]. A. linearis tea became known as a healthy drink after the success in the treatment of chronic restlessness, in a colicky baby by administration of Rooibos tea infusion. The parts of the plant that present pharmacognostic value are the leaves and the aerial parts: Aspalathis folium and Aspalathi herba [8]. A. linearis plant can be found in spontaneous flora as well as in cultures of medicinal plants for commercial purposes. The Rockland variety is cultivated and harvested to produce the well-known Rooibos tea [7]. There are two commercial sorts of Rooibos tea: Green Rooibos - unfermented tea; Red Rooibos - fermented tea (obtained from the plant after the fermentation process) [2]. Nowadays, studies of Aspalathus linearis reveal its composition in polyphenols (dihydrochalcones: aspalathin, nothofagin; free flavones and glycosides: orientin, iso-orientin, vitexin, isovitexin, luteolin, luteolin-7-O-β-D-glucoside; free flavonols and glycosides: quercetin, hyperoside, rutin; tannins) [5, 6]. Accordingly, the aim of this research was to analyse the bioactive compounds of A. linearis from 6 herbal teas available on the Romanian market, in order to evaluate the quality of the commercial products.

Materials and Methods

Plant material: 6 assortments of teas containing fermented Rooibos as a single plant were purchased from the Romanian market (manufacturers: AdNatura SRL, Celmar Trading SRL, Demmers Teehaus,
The antioxidant capacity of these extracts was determined by two methods: DPPH bleaching assay and the ferric reducing antioxidant power assay (FRAP). The antioxidant capacity of the six Rooibos extracts was investigated using the DPPH radical scavenging assay. The results showed moderate values of the antioxidant capacity for samples 1, 3, 4, 5, 6, with IC$_{50}$ < 100, compared to Trolox (IC$_{50}$ = 11.20 µg/mL). The greater antioxidant capacity had the sample 6, (IC$_{50}$ = 56.43 µg/mL). Our results were better than the reported value for African Rooibos (IC$_{50}$ = 83.4 µg/mL) [6]. The antioxidant activity performances order by FRAP test (expressed as µM Trolox equivalents/100 mL extract) for the six methanolic extracts was as follows: 6 > 5 > 3 > 4 > 1 > 2. The sample 6 showed the higher antioxidant capacity both by the FRAP and DPPH methods.

By HPLC analyses, some polyphenols were identified and quantified (Table II, Figures 1, 2 and 3).
The polyphenolic acids identified and quantified in our samples are: chlorogenic, \(p\)-coumaric, ferulic and sinapic acids. The ferulic and sinapic acids were identified and quantified in all six samples, with high levels for ferulic acid in Sample 3 (8.39 mg/100 g) and sinapic acid in Sample 6 (14.71 mg/100 g). \(p\)-Coumaric acid was identified and quantified in Samples 1 and 3 presenting a higher value in Sample 3 (1.34 mg/100 g). Chlorogenic acid was quantified only in Sample 1 (3.34 mg/100 g). Hyperoside, a flavonoid glycoside, was quantified in all six samples, with higher values in Samples 4 and 1 (20.28 and 15.43 mg/100 g); its concentration decreases as follows: Sample 4 > 1 > 3 > 6 > 5 > 2. Close values were found in the pairs of Samples 2 and 5 and Samples 3 and 6. Rutin was determined in two samples, 1 and 3, with a higher value in Sample 1 (14.51 mg/100 g). Isoquercitrin and quercitrin were quantified in samples...
Conclusions

The study conducted on 6 Rooibos tea assortments available on the Romanian market revealed a poor polyphenol composition with a moderate antioxidant capacity. The differences between the studied samples were both quantitative and qualitative. The polyphenols identified in all six samples were ferulic acid, syringic acid, hyperoside and luteolin, while quercitrin and isoquercitrin were present in four samples and rutin only in two samples. Our analysis confirmed the presence of antioxidant polyphenols in the Rooibos commercial teas, and highlighted the differences determined by the quality of the raw materials.

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References