Can medicinal granules replace traditional Chinese herbal decoctions?

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Purpose

Granules are a popular delivery form for Chinese medicinal herbs and are used as an alternative to decoction pieces in herbal prescriptions worldwide. However, questions have been raised regarding the quality, efficacy and safety of granules.

The aim of this study was to compare the chemical profiles and antioxidant activity of granules to their decoction pieces. This information will inform practitioners of the differences between the products in order to support their dosage regimes.

Method

Chromatography, chemometric analysis and antioxidant activity were established to compare granules and decoction pieces of Notoginseng Radix, Angelicae sinensis Radix and Salviae miltiorrhizae Radix.

• Extraction: Decoction pieces were first extracted in water (traditional method), followed by methanol. The granule products were extracted in methanol only to remove the excipients. Dried extract of raw herb and granule are considered to be comparable extracts for the analysis.

• Chromatography: Thin layer chromatography (TLC) and ultra performance liquid chromatography coupled with photodiode array detector (UPLC-PDA) qualitatively and quantitatively compared the samples. The calibration graphs of the marker compounds were constructed using partial least squares regression.

• Anti-oxidant activity: Assays including ABTS, FRAP and DPPH were performed to compare the activity of the granules to the raw herbs.

• Statistical analysis: Similarity between samples was performed by hierarchical agglomerative clustering analysis (HCA) and principle component analysis (PCA).

Results

Figure 1. Correlation plot (matrix) of marker compounds of Notoginseng Radix. The markers were compared between raw herb and granules in (G1-12) by UPLC-PDA coupled with photodiode array detector (UPLC-PDA).

Figure 2. Correlation plot (matrix) of marker compounds of Angelicae sinensis Radix. The herbal granules showed a trend for higher antioxidant activity.

Figure 3. Correlation plot (matrix) of marker compounds of Salviae miltiorrhizae Radix. The herbal granules showed a trend for higher antioxidant activity.

Discussion

UPLC proved to be the most sensitive method for quantification analysis for all three herbs, however, TLC provided good qualitative (Angelicae sinensis) and some quantitative (Notoginseng, Salvia miltiorrhiza) data. Water extraction predominantly extracted polar compounds, especially in the decoction pieces. Some non-polar components were prominent in the granule extracts, which raises questions about their preparations.

Decoction pieces were generally classified in one group.

There were variations among the granule products.

Antioxidant assays generally showed no significant differences between the groups, however, decoction pieces showed a trend for higher antioxidant activity.

Conclusion

The combination of multiple methods enabled a rapid and thorough analysis of the decoction pieces and granule products, whereby the differences in the contents of the major compounds could be detected. Differences in products indicates a difference in the manufacturer supply of granules and the importance of the quality assessment of herbal products.

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