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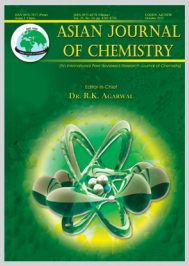

NOTE

Nutritional Elements and Heavy Metals in Tibetan Medicine *Terminalia chebula*

PENG SUN[1], YU-KUI RUI[2] and XIANEN LI[1,*]

[1]The Institute of Medicinal Plant Development, Peking Union Medical College Chinese, Academy of Medical Sciences, Beijing 100193, P.R. China
[2]College of Resources and Environmental Sciences, China Agricultural University, Beijing 100193, P.R. China

*Corresponding author: E-mail: xeli@implad.ac.cn

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Wild *Terminalia chebula* from Tibet were determined the contents of nutritional elements and heavy metals by ICP-MS to evaluate its quality. The results showed that there are many kinds of nutritional elements in wild *Terminalia chebula* from Tibet of China, *i.e.*, Ca, Fe, Mn, Zn, Cu, Se and Mo, whose contents were 756.33 μg/g, 133.98 μg/g, 6.75 μg/g, 9.48 μg/g, 4.81 μg/g, 316.27 ng/g and 10.98 ng/g respectively. The contents of four kinds of heavy metals *i.e.*, As 160.81 ng/g, Cd 14.86 ng/g, Pb 71.65 ng/g and Cr 184.40 ng/g, respectively in *Terminalia chebula* from Tibet. Compared with Tibetan medicine *Potentill ta anscri na* L. from Gansu proveince, *Terminalia chebula* from Tibet contained more As and less Cd and Pb. It is concluded that *Terminalia chebula* from Tibet meet to the standard "Green Professional Standard for Importing and Exporting Medicinal Herbs and Preparations" in terms of nutritional elements and heavy metals.

Key Words: ICP-MS, *Terminalia chebula*, Tibet, Nutritional elements, Heavy metals.

Tibetan Medicine *Terminalia chebula* is young fruit of *Combretaceae terminalia* species plant, which is good medicine for acute and chronic pharyngitis or chronic laryngitis, chronic tonsillitis and sore throat[1]. Some research also believed that *Terminalia chebula* has a preventive effect against type II diabetes by inhibiting activities on maltase[2]. As a good herbal medicine, *Terminalia chebula* was regarded as one drug in most researches, but little was done on its active ingredients[3].

In recent years, more and more attention has been paid on the relationship between nutritional elements and efficacy of herbal medicine[3,4]. At the same time, heavy metals as the important pollutant substance have been another indicator to evaluate herbal quality[5].

With the quick development of modern science, some new instruments provide a good opportunity to determine content of nutritional elements and heavy metals simultaneously, especially ICP-MS[6-8]. In this study, we determined the content of seven kinds of nutritional elements and four kinds of heavy metals in Tibetan Medicine *Terminalia chebula* to evaluate its quality.

Treatments of the *Terminalia chebula* samples: All samples were washed with distilled water to remove the dust, washed, air-dried and grinded with stainless steel grinder.

The apparatus is inductively coupled plasma mass spectrometry apparatus (ELAN DRCI).

Sample preparation: The samples were prepared by microwave digestion, the steps just as the reference[6]. Three times replicate. Instrument parameters were as described in the literature[7].

The results showed that there are many kinds of nutritional elements in wild *Terminalia chebula* from Tibet. They are Ca, Fe, Mn, Zn, Cu, Se and Mo, whose contents were 756.33 μg/g, 133.98 μg/g, 6.75 μg/g, 9.48 μg/g, 4.81 μg/g, 316.27 ng/g and 10.98 ng/g, respectively (Table-1). All these results suggested that *Terminalia chebula* from Tibet contains more Ca than Tibetan medicine *Polygonum viviparum* L. *Meconopsis quintuplinervia* Regel and *Halenia elliptica* D. Don, but less than Tibetan medicine *Oxy tropis falcata Bunge*, *Lagopsis supina* (Steph.) Ik.-Gal., *Hypecoum leptocarpum* Hook. f. et. Thoms, *Dracocephalum tanguticum* Maxim. *Terminalia chebula* from Tibet contains more Fe than Tibetan medicine *Polygonum viviparum* L., but less than Tibetan medicine *Meconopsis quintuplinervia* Regel and *Halenia elliptica* D. Don, *Oxy tropis falcata* Bunge, *Lagopsis supina* (Steph.) Ik.-Gal., *Hypecoum leptocarpum* Hook. f. et. Thoms and *Dracocephalum tanguticum* Maxim. *Terminalia chebula* from Tibet contains less Cu, Mn and Zn than all the above Tibetan medicine[9].

The contents of four kinds of heavy metals were showed in Table-2, whose contents were As 160.81 ng/g, Cd 14.86

TABLE-1
CONTENT OF NUTRITIONAL ELEMENTS IN *Terminalia chebula* FROM TIBET

Elements	Content	Elements	Content
Ca	756.33 µg/g	Cu	4.81 µg/g
Fe	133.98 µg/g	Se	316.27 ng/g
Zn	9.48 µg/g	Mo	10.98 ng/g
Mn	6.75 µg/g		

TABLE-2
CONTENT OF HEAVY METALS IN *Terminalia chebula* FROM TIBET (ng/g)

Elements	Content	Elements	Content
As	160.81	Pb	71.65
Cd	14.86	Cr	184.40

ng/g, Pb 71.65 ng/g and Cr 184.40 ng/g, respectively in *Terminalia chebula* from Tibet. Compared with Tibetan medicine *Potentill ta anscri na* L. from Gansu province, *Terminalia chebula* from Tibet contained more As and less Cd and Pb[10].

Contents of nutritional elements and heavy metals in plants were positively relative to local soil and climate. The results reveal that *Terminalia chebula* from Tibet has higher quality in terms of nutritional elements and heavy metals and meet the standard 'Green Professional Standard for Importing & Exporting Medicinal Herbs and Preparations'[11].

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