

## Determination of Heavy Metal Levels in *Carissa spinarum* and *Toddalia asiatica* Used as Herbal Medicines in Kisii and Nyamira Counties Region, Kenya

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**Abstract :** The plants *Carissa spinarum* and *Toddalia asiatica* have historically been used as herbal medicines in Kisii and Nyamira Counties region, Kenya. But, there is limited study about heavy metal contents in their different plant parts. Such information is necessary for proper use of the two plant species as herbal medicines. So, precise determination of heavy metal contents in different part of these herbs is required for quality, efficacy and safety use in the treatment of ailments. The main aim of this study was to standardize the two herbs of interest. The objective of this study was to evaluate the levels of heavy metal contents in the root of *Carissa spinarum* and *Toddalia asiatica*. A wet digestion method with concentrated nitric-hydrochloric acid was used for the dissolution of each herb part prior to elemental analysis. Standard solutions of various concentrations of each pure metal of analytical grade arsenic (As), cadmium (Cd) and mercury (Hg) were prepared and used. The analysis of As, Cd and Hg in each of two herbs was conducted by atomic absorption spectroscopy (AAS) Shimadzu model No. 6200. Data obtained from root of *Carissa spinarum* indicated concentration ( $\text{mgkg}^{-1}$ ) of Arsenic (As), Cadmium (Cd) and Mercury (Hg) were  $0.87 \times 10^{-3}$ ,  $7.02 \times 10^{-6}$  and  $0.66 \times 10^{-3}$  respectively. Results obtained from root of *Toddalia asiatica* showed concentration ( $\text{mgkg}^{-1}$ ) of Arsenic (As), Cadmium (Cd) and Mercury (Hg) were  $1.33 \times 10^{-3}$ ,  $7.32 \times 10^{-6}$  and  $1.13 \times 10^{-3}$ , respectively. The permissible limits set by WHO for As, Cd and Hg in herbs are ( $\text{mgkg}^{-1}$ )  $< 1 - 5$ ,  $< 0.3 - 1$  and  $< 0.1 - 0.5$  respectively. The concentrations of As, Cd, and Hg determined were relatively higher in the root of *Toddalia asiatica* than the root of *Carissa spinarum*. It was concluded that levels of heavy metal contents of As, Cd, and Hg in the root of *Carissa spinarum* and *Toddalia asiatica* were within permissible limits set by WHO/FAO.

**Keywords :** heavy metals, *Carissa spinarum*, *Toddalia asiatica*, wet digestion, pollutants, AAS

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