Short Communication Cell & Developmental Biology 2020
Vol.9 No.5

Learning and assessment of the chemical profiles of the pulp and the seed of Citrullus colocynthis by UHPLC-HRMS- F.D. Drissi- Tlemcen University, Algeria

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Citrullus colocynthis Schrad, also known as colocynth, is a very common fruit in traditional medicine; it is recognized by different pharmacologic activities in traditional Algerian medicine (i.e., purgative, anti-inflammatory, antidiabetic, analgesic, and antiepileptic. Some of these activities were confirmed in modern phytotherapy (Shaheen et al., 2014). Several scientific studies carried out on crude extracts of pulp and seed of colocynth have demonstrated the antimitotic effect (Sari-Hassoun et al., 2016), antidiabetic (Ebrahimi et al., 2016), antiparasitic (Cheraghi Niroumand et al., 2016), larvicidal (Hamid et al., 2016) as well as a preventive effect against obesity (Alhawiti, 2018). However, the bioactive chemicals compounds responsible of those activities are not isolated and identified yet.

This is perennial herbs usually trailing. Commonly found wild in the sandy lands of North West, the Punjab, Sind, and Central and southern India, and coromandal coast. Also found indigenous in Arabia, West Asia, and Tropical Africa and in the Mediterranean region. Commonly Citrullus colocynthis known as - Indravaruni (Sanskrit), Chitrapala or Bitter apple. Medicinally root, bark and leaves are used. Citrullus colocynthis shows mild stomachic, bitter tonic, diuretic and antilithic property. As per Ayurveda and Siddha system of medicine it is Tikta-rasam, ushna-veeryam and katu vipakam and used as purgative, diuretic, lagu, kapharam and abortifacient. Fruit is bitter, pungent and used as purgative, anthelmintic, antipyretic, carminative, cures tumors, leucoderma, ulcers, asthma, etc. Root is useful in jaundice, ascites, urinary disease, rheumatism.

Fruit
Each bitter apple plant produces around 15 to 30 globular fruits having a diameter of almost 7 to 10 centimeters. The outer portion of the fruit is covered with a green skin having yellow stripes. The fruits may also be yellow in color. The ripe fruits are characterized by a thin but hard rind. The fruits have a soft, white pulp which is filled with numerous ovate compressed seeds.

Seed
The seeds are around 6 mm in size, smooth, compressed and ovoid-shaped. They are located on the parietal placenta. The seeds are light yellowish-orange to dark brown in color.

MEDICINAL VALUE OF CITRULLUS COLOCYNTHIS

1. The fruits are bitter, pungent, cooling, purgative, anthelmintic, antipyretic, carminative, cures tumors, ascites, leucoderma, ulcers, asthma, bronchitis, urinary discharges, jaundice, enlargement of spleen, tuberculosis glands of the neck, dyspepsia, constipation, anemia, throat diseases, elephantiasis, joints pain.

2. Root is useful in jaundice, ascites, urinary diseases, rheumatism and given in abdominal enlargements and in cough and asthmatic attacks of children. A poultice of root useful in inflammation of the breast.

3. Fruit or root with or without nux-vomica is rubbed into a paste with water and applied to boils and pimples.

4. Past of the root is applied to the enlargement of abdomen of children

Starting from two fractions of ethyl acetate from pulp and seed obtained at the Lapsaab laboratory in Tlemcen (Algeria), our objective at the PharmaDev laboratory was first to better know the chemical composition in cucurbitacins of these 2 extracts and secondly to compare the chemical profiles of the seed and the pulp. We were then able to isolate and identify 5 molecules likely to be responsible for one of the activities mentioned previously.

Materials and methods

The dereplication part was carried out using a UHPLC-HRMS chain and the raw formulas were obtained via the softwre Xcalibur 3.0. The isolation of the molecules was done by different chromatographic methods: SPE, CC, MPLC and HPLC. Isolated molecules were identified by MS and 300MHz NMR.
UHPLC Technology facilitates improvements of resolution, sensitivity and speed to be achieved, without compromise. Whether the separation goal is to achieve ultra-fast analysis, increase throughput while maintaining resolution, improving resolution while decreasing analysis time or achieve ultra-high resolution, the flexibility of the ACQUITY UPLC System enables method requirements to be met.
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This work is partly presented at Joint Event on 20th International Conference and Exhibition on Pharmaceutics & Novel Drug Delivery Systems March 18-20, 2019 at Edinburgh, Scotland

Technology works, how to be successful with it, and how it can provide impactful results within their organization.

Results

The LC-MS and TLC results showed that the chemical profiles of the seed and pulp ethyl acetate extracts are similar, that would explain why both are active on the same targets. We have also demonstrated the heterogeneity of the cucurbitacins, around twenty cucurbitacins have been identified in each fraction and some of them have never been described in C. colocynthis.
The major compound isolated from the two extracts is elaterinid. Other cucurbitacins and a benzoic acid derivative have been isolated and identified: cucurbitacin E, cucurbitacin I, glycosylated cucurbitacin I and 4-hydroxybenzaldehyde.

Conclusion

Our data first demonstrate the similarity in the cucurbitacin composition of the seed and the pulp. These results suggest that the various biological activities of the colocynth could be due to the action of one or many cucurbitacins.

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