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SHORT COMMUNICATION

LC/MS-MS Analyses and *in vitro* anticancer activity of *Tourneuxia variifolia* extracts

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ABSTRACT

Several Saharan plants, despite their abundance of natural compounds, have received little attention. In this study, the chemical composition of polar extracts of *Tourneuxia variifolia* Coss. (Asteraceae), an endemic species to Algerian Sahara, was investigated and their anticancer activity was evaluated *in vitro*. The phytoconstituents of both ethyl acetate (EtOAc) and *n*-butanol (*n*-BuOH) extracts were screened using LC/MS-MS technique. The anticancer activity of the above extracts was measured against human cervical adenocarcinoma (HeLa) cell line. The LC/MS-MS analyses results revealed that twenty-seven phytochemicals in EtOAc extract and twenty-three in *n*-BuOH extract were identified and quantified from which isoquercetin and astragalin were the most present. Moreover; the EtOAc extract was found to have a strong anticancer activity (IC_{50}: 46.797 ± 0.060 µg/mL). These findings identified *T. variifolia* as a potential plant exhibiting anticancer properties.

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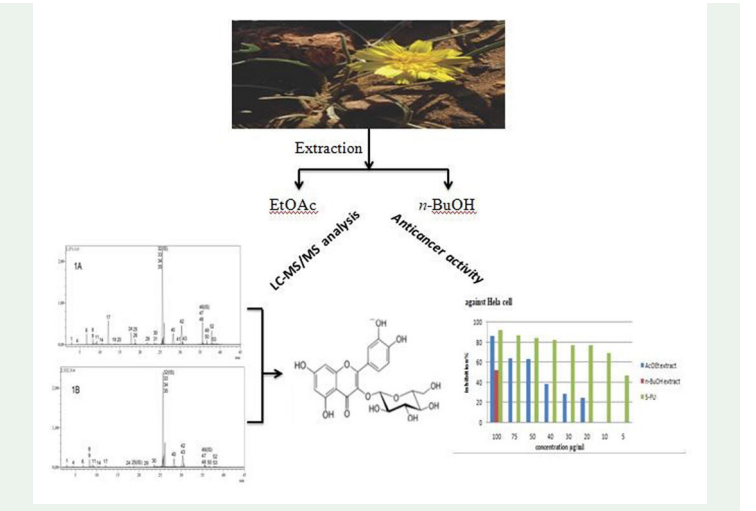

1. Introduction

Being a major global public health problem, mortality rates and the incidence of cancer continue to rise. 9.6 million cancer deaths and 18.1 million new cancer cases were estimated in 2018 (Bray et al. 2018). Among men, prostate cancer was second of cancer diagnosed with 15.0%. Globally, cervix cancer is detected to be the third most common cancer among women (Ferlay et al. 2013). Many studies have been conducted on the ability of natural products and their derivatives to inhibit and reverse cancer growth. Surveys indicated that, nearly 80% of cancer patients use natural products in combination with classic anticancer drugs (Dennis et al. 2009). Flavonoids are the best known and most studied (Raj et al. 2001). They have many distinct health benefits (Patil et al. 2009; Crozier et al. 2009), as well as antitumor (Cushman and Nagarathnam 1991; Choi et al. 1999), antiviral (Selway 1986; Wang et al. 1998) and antimitotic (Wang et al. 1998) properties. In this paper, we investigated for the first time, *T. variifolia* Coss. which is an endemic species belonging to the Asteraceae family, as well as the later is the unique in *Tourneuxia* genus. A literature survey showed that there were no studies related to the phytochemical and biological properties of this endemic specie, this lack led us to conduct this study trying to determine the chemical composition of EtOAc and *n*-butanol extracts using LC/MS-MS analyses as well as their anticancer activity.

2. Results and discussion

The EtOAc and *n*-BuOH extracts of *T. variifolia* were analyzed by LC/MS-MS method described and validated by Yilmaz (2020). Twenty-seven and twenty-three compounds were detected and identified with retention time varying between 3.0 to 41.7 min in EtOAc (Figure S1A) and *n*-BuOH (Figure S1B) extracts. An overview of both chromatograms indicates a much greater richness of the EtOAc extract (Figure S1A) in comparison with *n*-BuOH extract (Figure S1B), Both chromatograms show two major peaks at

tr 25.6 and 30.4 min identified as isoquercetin (20.482; 26.004 mg of analyte/g of extract) and astragalin (18.371; 11.902 mg/g of extract) respectively. The other peaks were characterized by the presence of several phenolic acids and flavonoids. The most prominent of which were protocatechuic acid, *p*-coumaric acid, quinic acid, isoquercetin, astragalin, quercetin, rutin, apigenin, luteolin, and kampferol, in addition to other flavonoids and phenolic acids were found in trace amounts.

The anticancer activities of EtOAc and *n*-BuOH extracts for *T. variifolia* and 5-FU were determined against HeLa cells (Figure S2). Although; EtOAc extract (IC_{50}: 46.797 ± 0.060 μg/mL) was detected to have remarkable anticancer activity compared with 5-FU at high concentrations. However; *n*-BuOH extract (IC_{50}: 89.361 ± 0.082 μg/mL) has moderate antiproliferative activity compared with standard at 100 μg/mL concentration. The anticancer activity of both EtOAc and *n*-BuOH extracts of *T. variifolia* in this study was very interesting because of the possible toxic effects of their phytoconstituents. It was shown that quercetin is able to inhibit proliferation of several cancer cell lines at 0–200 μM, 24 h incubation inhibited the cell viability of colon cancer HCT-15 and RKO (De Freitas et al. 2016), and at 0–300 μM, 5 days incubation inhibited the proliferation of the breast cancer and the ovarian cancer cell lines (Granato et al. 2017; Won et al. 2020). In particular, quercetin has also been reported to suppress viability of cervix HeLa cancer cells (Xintaropoulou et al. 2015). Besides; isoquercitrin has been reported to halt the growth of several types of cancer cells such as: selected colon cancer cell lines (Choi et al. 2001), murine carcinoma (Amado et al. 2009), and SK-MEL-2 human skin (Amado et al. 2014) cancer cell lines.

Furthermore; a number of studies have investigated the anticancer activity of astragalin against various cancer cell lines, including: hepatocellular carcinoma and lung cancer (Chen et al. 2017; Li et al. 2017) and human leukemia cells (Burmistrova et al. 2011). On the other hand, Yin et al. 2009 reported that at lower concentrations of protocatechuic acid could provide apoptotic effects in human breast, lung, liver, prostate and cervix cancer cells.

3. Conclusion

For the first time, *Tourneuxia variifolia* aerial parts extracts were subjected to LC/MS-MS analyses to identify and quantify phenolic and flavonoid components, as well as to assess their biological activities. The investigation of both EtOAc and *n*-BuOH extracts of *T. variifolia* yielded the identification of twenty-eight chemicals with high quantities of glycolisated flavonoids. Finally; this study shows that EtOAc and *n*-BuOH extracts have potent anticancer properties, owing to the presence of phenolic compounds in the extracts. Based on these findings, *T. variifolia* could be identified as a potential plant exhibiting anticancer properties

Disclosure statement

No potential conflict of interest was reported by the authors.

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Abbreviations

EtOAc Ethyl acetate
n-BuOH *n*-butanol

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