

PRELIMINARY PHYTOCHEMICAL AND ANTIMICROBIAL ACTIVITY INVESTIGATIONS ON THE AERIAL PARTS OF *Helianthemum kahiricum*

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The genus *Helianthemum* Miller belongs to the Cistaceae family [1, 2]. It includes approximately 24 species most of which are distributed in the Mediterranean Basin. However, some of them have a more eccentric distribution, some toward Central Asia (*H. songoricum schrank*), and others toward the north of Europe (*H. nummularium* (L.) Mill.)

H. oelandicum (L.) DC. Mexican traditional folk medicine uses *Helianthemum glomeratum* as a remedy against gastrointestinal disorders such as diarrhea and dysentery [3].

However, to the best of our knowledge, very few chemical studies of the genus *Helianthemum* are reported in the literature, and only the essential oil of *Helianthemum kahiricum* (Del.) has been described [4].

The first results of our chemical investigation on the butanol-liposoluble extract of the aerial parts of the Algerian specimens *Helianthemum kahiricum* led to the isolation of two natural compounds exhibiting a flavone glycosyl skeleton, kaempferol-3- β -D-(6-*O*-*trans*-*p*-coumaroyl) glucopyranoside (**1**) and kaempferol-3- β -O-(3'',6''-di-*O*-*trans*-*p*-coumaroyl) glucopyranoside (**2**), representing new kaempferol derivatives in the family Cistaceae L. These two compounds were fully characterized by spectral methods, mainly NMR techniques. A survey of the literature on kaempferol glycoside showed that **1** is structurally related to the known buddlenoid from *Beddeleia coriacea* (Loganiaceae) [5] and identical to those isolated from *Muntingia calabura* (Muntingiaceae), *Pinus contorta* (Pinaceae), *Fragaria ananassa*, *Potentilla chinesis* (Rosaceae), and *Stenochlaena palustris* (Polypodiaceae) [6–10].

Our assignment for compound **2** was in agreement with those reported in the literature for the same compound isolated from *Stenochlaena palustris* (Polypodiaceae) [9].

Evaluation of the Antimicrobial Activity. The antimicrobial activity of *Helianthemum kahiricum* was determined by the diffusion technique on solid media. Strains of human pathogen microorganisms used in this study were as follows: *E. coli* (ATCC 25922), *Staphylococcus aureus* (ATCC 25923), *Pseudomonas aeruginosa* (ATCC 27853), *Enterobacter* ESBL, and multidrug-resistant *Staphylococcus* and *Pseudomonas* CAZR. The antimicrobial activity is determined by measuring the diameter of the inhibition zone of microbial growth produced around the disks after incubation at 35°C for 24 hours (Table 1).

The inhibitory effect on bacterial growth was determined using the agar-disc diffusion assay [11, 12].

According to the results given in Table 1, the butanol crude extract exhibited very strong antimicrobial activity against all tested strains. Moreover, activity was more effective against gram positive than gram negative bacteria, with diameters between 15 and 16 mm for gram-positive bacteria and between 9 and 15 for gram-negative bacteria. The first dilution of the same extract showed activity against *Staphylococcus aureus* (ATCC) and *Staphylococcus aureus* (MRSA) (11 mm and 10 mm, respectively). The chloroform extract of *Helianthemum kahiricum* displayed moderate activities against all the tested bacterial strains, while the petroleum ether extract showed inactivity.

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TABLE 1. Screening Results for Antimicrobial Activity of Some Crude Extracts of *H. kahiricum* Disc Diffusion Method

Bacterium	Extract		
	petroleum ether	chloroform	butanol
<i>Escherichia coli</i>	< 6	10	15
<i>Enterobacter cloacae</i>	< 6	9	14
<i>Staphylococcus aureus</i> (ATCC)	6	8	15
<i>Staphylococcus aureus</i> (CAZR)	8	7	16
<i>Pseudomonas aeruginosa</i> (ATCC)	6	8	9
<i>Pseudomonas aeruginosa</i> (CAZR)	6	10	5

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