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Essential oils of *Pulicaria odora* L: chemical composition and effect on anti-aging gene expression in human keratinocyte cells

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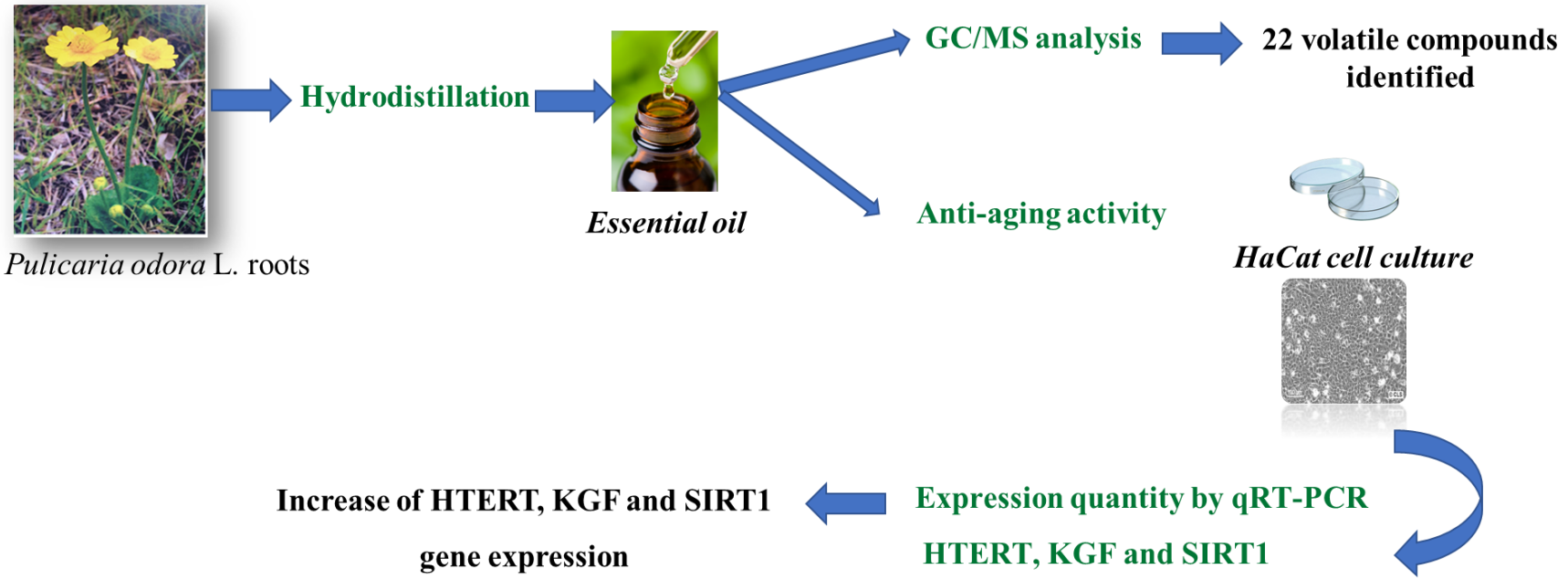
Graphical Abstract



Abstract

In traditional Moroccan medicine, the roots of ***Pulicaria odora* L.** (PO) are used against **menstrual cramps** and **intestinal disorders** and are highly valued as a **spice** for their **flavor**. Several natural compounds are characterized by various biological properties such as **antimicrobial, antiviral, antioxidant, anticancer and anti-aging**.

Abstract

In this study, **PO essential oil (EO)** is evaluated for the first time for its effect on:

i) **The HTERT gene,** a catalytic enzyme that is required for telomerase activity,

ii) **The human keratinocyte growth factor (KGF),** a secreted protein that could play an important role in the repair of skin injury and that has also been implicated to play a role in other diseases,

iii) **The Sirtuin 1 (SIRT1),** which plays an essential role in regulating the cell cycle and energy homeostasis.

- The **EO** of **PO roots** was obtained by hydrodistillation and analyzed by **GC/MS**. We used Quantitative reverse transcription-polymerase chain reactions (**qRT-PCR**) to determine the effect of the EO on expression levels of **KGF, SIRT1, and HTERT** genes in **HaCaT cells**.

- We have identified **22 volatile compounds** representing **93.76%** of the oil by GC/MS. The oil was dominated by **oxygenated compounds** with about **93.32%** against only **0.44%** of terpene hydrocarbons.

- The **KGF** expression level in **HaCaT cells** exposed to **EO** is found to be significantly **higher than** resveratrol (RSV) ($p<0.05$). Also, the **EO** and resveratrol have induced a **similar activity** on **HTERT** and **SIRT1** expression ($p<0.05$).

Keywords: *Pulicaria odora*, essential oil, antiaging, GC/MS, gene expression, HaCat cell

Introduction

- **In the literature, only two studies (Ezoubeiri et *al.*, 2005; Hanbali et *al.*, 2005) have been reported on the characterization of *Pulicaria odora* L. essential oils, moreover no information is available on antiaging activity of this species.**

- Characterized the chemical composition of ***P. odora*** **essential oil** by **GC/MS analysis;**

- Evaluated the effect of ***P. odora*** **essential oil** on **KGF, HTERT** and **SIRT1** gene expression on **human keratinocyte cell.**

Results and discussion

1. GC analysis of *P. odora* essential oil

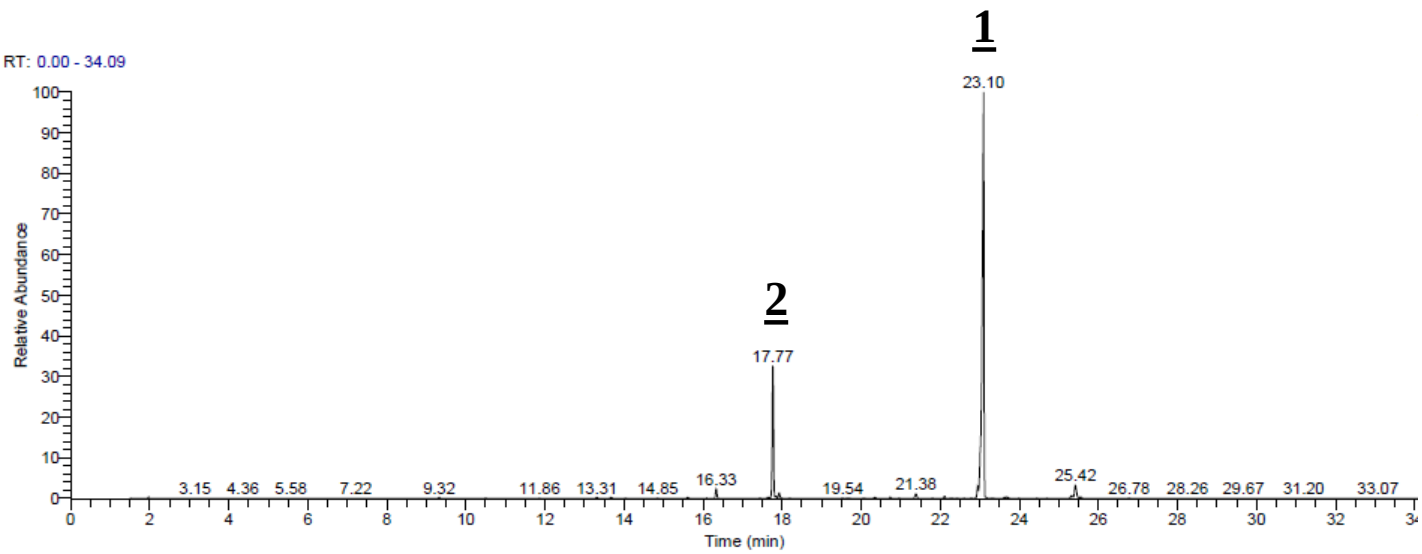


Fig.1: Gas chromatographic profile of the essential oil from the roots of *P. odora*

Results and discussion

2. GC/ MS analysis of *P. odora* essential oil

- **22 compounds representing 93.76% of the oil were identified by GC/MS**

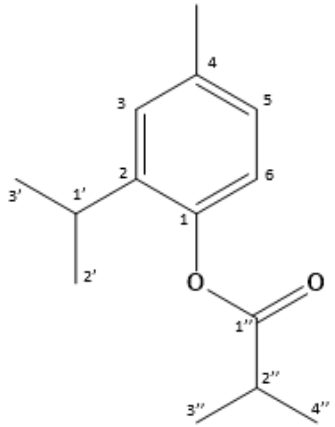
Oxygenated compounds (93.32%)

Terpene hydrocarbons (0.44%)

Results and discussion

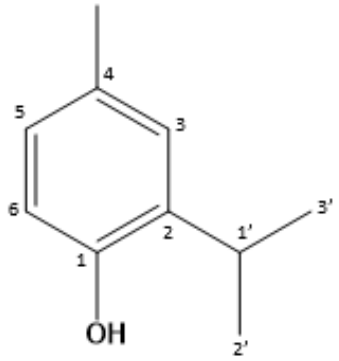
Oxygenated compounds

The compounds 1 and 2 were identified by GC/MS and their structure was confirmed by RMN H^1 & C^{13}



1 (73.37%)

Isobutyric acid 2-isopropyl-4-methyl-phenylester



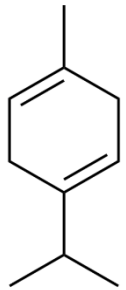
2 (17.59%)

2-Isopropyl-4-methylphenol

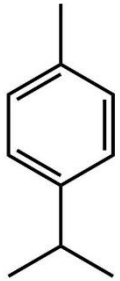
Results and discussion

2. GC/ MS analysis of *P. odora* essential oil

Terpene hydrocarbons



α-Terpinene (0.02%)



***p*-Cymene (0.02%)**

Results and discussion

3. Expression quantity by RT-PCR HTERT, KGF and SIRT1 treated by *P. odora* essential oil

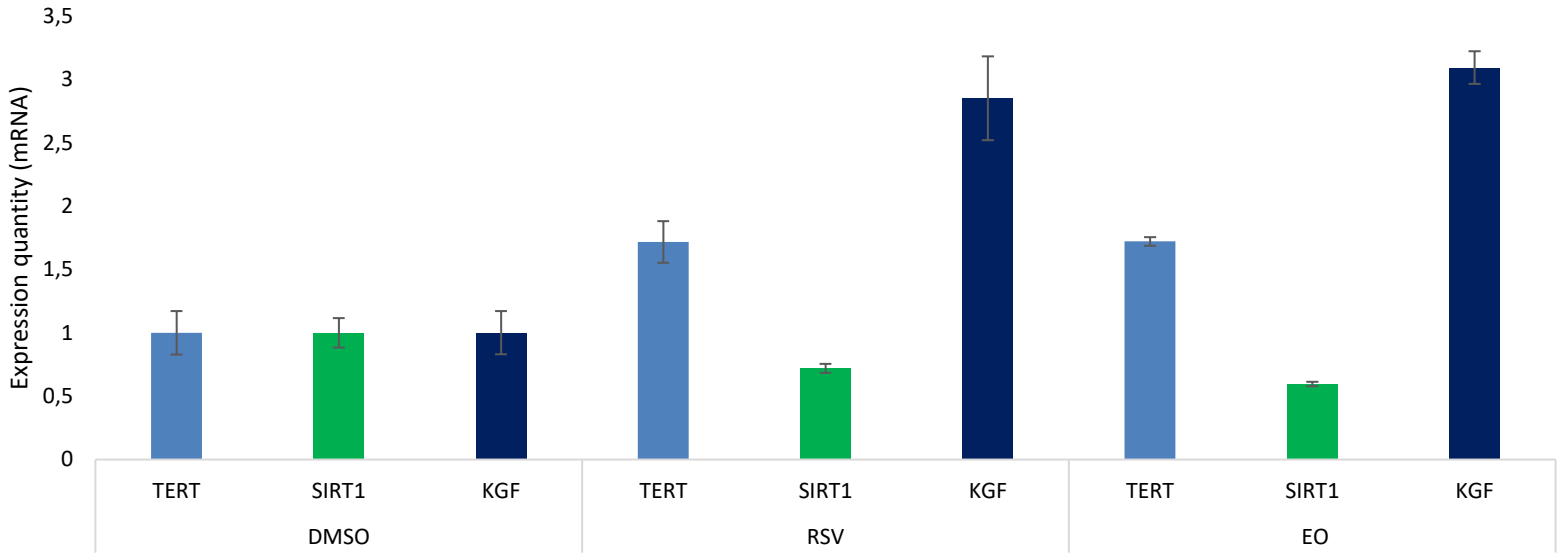


Fig. 2: Effect of essential oil on endogenous HTERT, KGF and SIRT1 gene expression in Hacat cell.

Results and discussion

3. Expression quantity by RT-PCR HTERT, KGF and SIRT1 treated by *P. odora* essential oil

- The **KGF** expression level in **HaCaT cell** exposed to EO is found significantly **higher than** the positive control **resveratrol (RSV)** ($p<0.05$).
- The **EO** and resveratrol have induced a **similar activity** on **HTERT** and **SIRT1** expression ($p<0.05$).

Conclusions

- We identified **22 volatile compounds in *P. odora* essential oil** by **GC/MS analysis**, the content of the majority volatile products (1 and 2) is strongly influenced by the **method of extraction** of the essential oil.

To sum-up, this study can be considered as the first report on antiaging capacity of *P. odora* essential oil that can enhance SIRT1, HTERT and **KGF** gene expression in human keratinocyte cell.

Acknowledgments

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