Mini Review

Nutritional Potential of Citrus Sinensis and its Pharmacological Action: A Concise Review

Madiha Khan Niazi*, Farooq Hassan†, Syed Zahoor ul Hassan Zaidi‡, Ayesha Aslam§, Quratul Ain Shahid¶, Wajeeha Arooj¶, Talha Noor†, Saira Ghaffar¶, Azka Afzal Sahi† and Nimra Naeem†

1University Institute of Diet and Nutritional Sciences, Faculty of Allied Health Sciences, The University of Lahore, Lahore, Pakistan
2Punjab Healthcare Commission, Lahore, Pakistan
3Faculty of Eastern Medicine, Hamdard University, Karachi, Pakistan
4University College of Conventional Medicine, Faculty of Medicine and Allied Health Sciences, Islamia University of Bahawalpur, Pakistan

ARTICLE INFO

Key Words:
Fruits, Citrus Sinensis, Orange, Health Benefits

How to Cite:

ABSTRACT

Currently, the pharmaceutical industry is becoming increasingly interested in the quest for novel medications derived from natural resources. Since ancient times, new pharmaceuticals have been created using natural ingredients. Secondary metabolites that have been discovered to have advantageous qualities are abundant in plants. This review highlights the medicinal potential of C. sinensis as a source of natural chemicals with significant health-promoting properties that could be exploited to create novel medications.

INTRODUCTION

The largest fruit tree crop in the world is citrus. The Rutaceae family of evergreen shrubs and small trees includes citrus [1]. Citrus is produced in tropical, subtropical, and temperate climates. In the Northern Hemisphere, fruits especially oranges and grapefruit—mature between mid-December and early April. Fruit is generally available all year long. The vitamin C, carotenoids, flavonoids, pectin, calcium, potassium, and other vital nutrients in citrus fruit make it one of the most significant fruits in the world. Citrus fruits are prized as a valuable source of soluble and insoluble fiber with several advantages, including eliminating toxins from the body[2]. Citrus fruit has higher concentrations of phenolic compounds, vitamins C and A, terpenes, phytonutrients, flavonoids, and terpenoids than other fruits[3].

Chemical Composition

The pharmacological effects attributed to C. sinensis are a result of the many secondary metabolites found in this...
plant [4]. The fruits, peel, leaves, juice, and roots of C. sinensis have been reported to contain the following categories of chemical substances: Flavonoids, Steroids, alkanes, fatty acids, and hydroxyamides, coumarins, peptides, carbohydrates, carboxamides and alkylamines, carotenoids, volatile compounds and dietary components [5] as shown in Table 1.

<table>
<thead>
<tr>
<th>Component</th>
<th>Citrus Sinensis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture (g)</td>
<td>88.4</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>0.8</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>0.3</td>
</tr>
<tr>
<td>Fiber (g)</td>
<td>0.5</td>
</tr>
<tr>
<td>Carbohydrates (g)</td>
<td>9.3</td>
</tr>
<tr>
<td>Minerals (g)</td>
<td>0.7</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>40</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>30</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>0.7</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>50</td>
</tr>
<tr>
<td>Energy Kcal</td>
<td>43</td>
</tr>
</tbody>
</table>

Table 1: Chemical composition of Citrus Fruits (per 100g of edible portion)

**Pharmacological Actions**

**Antibacterial Activity**

The antibacterial properties of C. sinensis essential oil, raw extracts, and purified components have been demonstrated in several studies [6]. The minimum inhibitory dose (MID) against Enterococcus faecium and E. faecalis was 50 mg/L, and the MIC range for bergamia essential oils was between 0.25 and 0.5% (v/v). L. monocytogenes, E. coli, and other germs were effectively combated by C. sinensis oil [7]. C. extracts in hexane and acetone sinensis leaf demonstrated 27 mm inhibitory zones for Helicobacter pylori. In this investigation, the examined extracts had less activity than the usual medications. However, it is feasible to obtain molecules with more activity from the extract that is the most active as depicted in Figure 1[8].

**Antifungal Activity**

Finding novel antifungal medicines has become necessary due to the rise in fungal infections, and C. sinensis is a strong contender in this regard [9]. Identified compounds from the damaged peel of C. paradisa MacFaden or C. sinensis L. Osbeck. Cladosporium cucumerinum and Candida albicans were both active against cv. Marsh [10].

**Antiproliferative Activity**

C. sinensis fruit juice reduced the growth of normal human prostatic epithelial cell line PZ-HPV-7 and Chinese hamster lung fibroblast cell line V79-4 [11]. Polymethoxyavone-rich C. sinensis peels showed effectiveness against human lung cancer cells [12]. A number of flavones derived from orange peel extract were shown to have inhibitory effects against cell proliferation (IC50) and to induce apoptosis (AC50) when applied to HL-60 cell lines [13]. Flavones and isoflavones have been shown to promote cell death and suppress cell growth in MCF-7 breast cancer cells [14].

**Hypocholesterolic Activity**

C. sinensis has advantageous qualities that are related to cholesterol, a severe health issue [15]. Because the fruit’s micro sized insoluble bers increased the excretion of bile acids (129%–133%) and cholesterol (123%–126%) in stool, the levels of blood triglycerides and total cholesterol were reduced [16].

**Protective of UV Activity Excessive**

C. sinensis red orange extract shown protective properties against ultraviolet B (shortwave) damage that was brought about in human keratinocytes [17]. This function may prevent oxidative stress-related cellular processes like inflammation and apoptosis. Orange is a potential contender for sun care products [18].

**Anxiolytic Activities**

The use of essential oils and extracts in aromatherapy is a complementary medical procedure [19]. Dental patients experienced a calming and relaxing effect after being exposed to the ambient scent of C. sinensis pure essential oil. C. sinensis extracts in methanol and dichloromethane exhibited sedative-like effects in Wistar rats [20].

**C O N C L U S I O N S**

Natural substances can be used to create new pharmaceutical compounds, and this tendency will persist. Recently, natural product research has drawn increased interest as a result of conventional drug discovery methods’ failure to yield a large number of lead molecules in critical therapeutic areas. This review is a great resource for learning more about C. sinensis because there is a need to educate the general public on the importance of this plant and the importance of finding new and potent drug compounds.
C o n f l i c t s o f I n t e r e s t
The authors declare no conflict of interest.

S o u r c e o f F u n d i n g
The authors received no financial support for the research, authorship and/or publication of this article.

R E F E R E N C E S