

## Phytochemical screening and antioxidant activity of Sudanese *Solanum dubium* leaf

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### Abstract

Phytochemical screening was carried out on the methanol extract of *Solanum dubium* leaf. It revealed the presence of flavonoids, tannins, saponins, sterols and alkaloids. Flavonoids are known to exhibit biological activities, including antiallergic, antiviral, anti-inflammatory, and antimicrobial properties. Flavonoids are potent water-soluble antioxidants and free radical scavengers, which prevent oxidative cell damage and have anticancer activity. In this study the methanol extract of *Solanum dubium* leaf was evaluated for antioxidant activity. The extract showed significant antioxidant activity compared to the positive control – propyl gallate.

**Keywords:** solanum dubium, phytochemical screening, antioxidant activity

### Introduction

Plants have a variety of chemical constituents-phytochemicals-with protective and healing properties [1]. *S. dubium* is a plant of potential medicinal attributes in the family Solanaceae. Many species of this important plant family are cultivated in many countries for their nutritional and medicinal values [2-4]. Some species of the family Solanaceae are endowed with antioxidant anti-inflammatory antithrombotic and anticancer properties [5-8].

*S. dubium* has a long history in phytomedicine. It is a well-known wild plant growing in most regions of Sudan and widely used in Sudanese system of medicine. *Solanum* plants contain steroidal substances of considerable medicinal and economic importance due to the suitability of these substances as synthons for the synthetic approach to steroidal drugs such as corticosteroids and sex hormones.

### Materials and Methods

#### Collection of plant material

*Solanum Dubium* leaves were collected from Khartoum-Sudan. The plant was authenticated by comparison with a reference herbarium sample.

#### Preparation of methanol extract

To (100g) dried, coarsely powdered leaves (300 ml) of 80% methanol was added. The material was heated in a water bath for one hour. After cooling to room temperature the mixture was filtered. The volume was then adjusted to (500 ml) with 80% methanol.

#### Preparation of aqueous extract

Two hundred grams of dry powdered *S. dubium* leaves were macerated with water. Following filtration, the filtrate was used for phytochemical screening according to the method described by Harborne [9].

#### Antioxidant activity

DPPH radical scavenging was determined according to the method of Shimada *et. al.* [10] with some minor modifications. Briefly, the test samples were allowed to

react with 2.2 Di (4-tert-octylphenyl)-1-picryl-hydrazyl stable free radical (DPPH) for half an hour at 37° C. The concentration of DPPH was kept as (300 µM). The test samples were dissolved in DMSO while DPPH was prepared in ethanol, after incubation for 30 min., the decrease in absorbance was measured at  $\lambda_{max}$  517 nm using multiplate reader spectrophotometer. Percentage radical scavenging activity of samples was determined in comparison with a DMSO-treated positive control. All tests were run in triplicate.

### Results and Discussion

The methanol and aqueous extracts of *Solanum dubium* leaves were screened for major secondary metabolites. The screening revealed the presence of sterols, saponins, tannins, flavonoids, alkaloids, reducing compounds and cardenolides. Coumarins were detected only in the aqueous Extract while both aqueous and methanol extracts were devoid of carbohydrates and triterpenes. (Table 1).

The phenolic compounds are one of the largest and most ubiquitous groups of plant secondary metabolites. Several studies have described the antioxidant properties of medicinal plants which are rich in phenolic compounds<sup>11</sup>. Natural antioxidants mainly come from plants in the form of phenolic compounds such as flavonoid, phenolic acids, tannins, tocopherols etc. The phytochemical screening of the studied plant indicated the presence of saponins which are known for their physiological activity, the phytochemical screening also revealed the presence of alkaloids which have been associated with medicinal uses for centuries and one of their common biological property is their cytotoxicity.

The presence of biologically interesting molecules like flavonoids alkaloids and steroids in *Solanum dubium* leaves afford a rationale for the ethnobotanical use of *Solanum dubium* leaves.

#### Antioxidant activity

The antioxidant activity of the methanol extract of *Solanum dubium* leaf has been evaluated. The bioassay was carried

out by measuring the capacity of the test sample against stable DPPH radical. The change in color was measured spectrophotometrically at  $\lambda_{\max}$  517nm. As displayed in (Table 2) the extract exhibited significant antioxidant activity.

**Table 1:** Phytochemical screening of *Solanum dubium* leaf

Teats	Methanol extract	Aqueous extract
Triterpene	—	—
Sterols	+++	+++
Saponins	+++	+++
Tannins	+++	+++
Flavonoids	+++	+++
Leucoantho cyanins	++	++
Alkaloids	+++	+++
Reducing compounds	++	++
Carbohydrates	—	—
Cardenolides	+++	+++
Coumarins	—	++

(+++)= Abundant; (++) = moderate, (-) = absent

**Table 2:** Free radical scavenging activity of methanol extract

Sample	RSA % $\pm$ SD
<i>Solanum dubium</i> methanol extract	80 $\pm$ 0.0
Propyl gallate (control)	92 $\pm$ 0.01

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