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Research Article

Isolation of one Compound from of *Syzygium cumini* L. Leaves Responsible for UV Radiation Absorption

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Abstract

Since long *Syzygium cumini Linn*. (*S. cumini* L.) is being used for treatment of several diseases. In Ayurveda the plant is used to pacify kapha and pitta dosha. It is also used as tonic for weakness, to treat problems of gum, teeth, eye, skin as well as to correct anemia and sexual weakness. Modern researches explored a wide range of pharmacological properties of this plant. These include anti diabetic, anti microbial, anti fertility, anti cancer, anti inflammatory, anti oxidant, anti gastric ulcer, hepato protective, gastro protective etc. Recently we have noted UV absorption property of *S. cumini* L. leaves and maximum absorption was found during rainy season. In the present work we tried to isolate the active compound from the plant leaves responsible for UV radiation absorption. *S. cumini* L. leaves were processed for isolation work by standard methods. Solvent extraction and acid hydrolysis were done followed by solvent treatment, chromatographic experiments. Finally a compound was crystallized. UV absorption property of the isolated compound was studied. The compound showed maximum absorption at 200 nm. The compound, therefore, may be used to protect humans from UV radiation absorption.

Keywords: *Syzygium cumini* Linn. Leaves; UV Absorbing Property; Isolation of Active Compound; Sunscreen Lotion

Introduction

S. cumini L. (family, Myrtaceae) is a large evergreen tree and a tropical fruit tree of great economic importance. Commonly known as Jambul tree the plant is found almost everywhere in India, Bangladesh, Nepal, Pakistan and Indonesia [1].

S. cumini L. contains several phytochemicals. Myricetin, ellagitannin, nilocitin, 3-0-ß-D-glucaronopyranoside n-hepatcosane, kaempferol, and aminoacids like alanine, glycine etc. are present in leaves. Stem bark contains, n-octacosanol, n-triacontanol, ß-sitosterol-D-glucoside, astragalin, betulinic acid, crategolic (maslinic) acid, soxalic acid, citric acid, betulinic acid, ß-sitosterol, n-nonacosane, quercetin, myricetin, sitosterol, glycolic acids, n-hentriacontane, kaempferol-3-o glucoside, eugenin, friedelin, epi-friedelanol and gallic acid. Flower has quercetin, kaempferol, erategolic acid (maslinic acid), Oleanolic acid, and myricetin flavonoids –isoquercitrin [2,3].

S. cumini L. is a potential source of nutraceuticals [4]. The plant has wide range of pharmacological properties. Bark and pulp of the plant are efficacious for diabetes; fruit is anti hyper lipidemic, possessing anti cancer property; seeds exert anti inflammatory and anti gastric ulcer activity; leaf has anti viral, anti allergic, anti bacterial, anti diabetic, anti oxidant and anti DNA damage activities [5].

Recently we have seen that *S. cumini* L. leaf has UV absorption activity and maximum activity was found during rainy season [6,7]. Therefore, aim of the present work was to isolate the active compound present in leaves of *S. cumini* L. responsible for UV absorption property..

Materials and Methods

Plant material

S. cumini L. leaves were purchased from the local market during rainy season. Leaves were authenticated by the taxonomist of the department of Botany of the University of North Bengal, Siliguri. A voucher specimen was kept in the department of Medical Biotechnology, Sikkim Manipal Institute of Medical Sciences of Sikkim Manipal University, Gangtok, Sikkim, India for future references.

Figure 1: *S. cumini* L. leaves.

Preparation of the plant leaves

S. cumini L. leaves were washed thoroughly under running tap to remove dust and then by distilled water. Leaves were shade dried and powdered. The powder was used for isolation study.

Chemicals

Chemicals required for the study were purchased from Himedia Lab and Loba Chem. Lab, India as well as from Merck, Germany.

Isolation of active compound

This was carried out by the following steps. Principles of standard isolation procedures of chemical compounds from plant sources are applied [8-11].

Powdered leaves of *S. cumini* L. (50 g)

SOLVENT EXTRACTION

Extracted with 500 ml of acetone in soxhlet at 37^{0}C for 20 minutes. It was then centrifuged. Supernatant was evaporated to dryness.

Brown mass

ACID REFLUX

Refluxed with 50 ml of 1(N) HCl for 15 min on a water bath at 100 ^{0}C. It was then cooled and centrifuged. Supernatant was evaporated to dryness.

Brown mass

TREATMENT WITH ETHYL ACETATE

Extracted with 50 ml of ethyl acetate on a rotary shaker for 15 min. It was then centrifuged. Supernatant was evaporated to dryness.

Brown mass

ALUMINA COLUMN CHROMATOGRAPHY

Brown mass was extracted with 50 ml of acetone for 15 min. It was then filtered. With filtrate alumina column chromatography was performed. Elution was done by acetone – ethyl acetate mixture (1:1 v/v).

Third band was found active

POLYAMIDE COLUMN CHROMATOGRAPHY

Eluent of active third band was evaporated to dryness. The dry mass was extracted with 50 ml of acetone for 15 min. It was then filtered and the filtrate was subjected to column chromatography using polyamide as adsorbent. Elution was done by acetone – ethyl acetate mixture (1:1 v/v).

Fourth band was found active

SILICA GEL G CHROMATOGRAPHY

Eluent of active fourth band was evaporated to dryness. The dry mass was extracted with 50 ml of acetone for 15 min. It was then filtered. With filtrate silica gel G column chromatography was done. Elution was by acetone – ethyl acetate mixture (1:1 v/v).

First band was found active

CRYSTALLIZATION

Eluent of the active first band obtained from the above step was evaporated to dryness. Repeated crystallization was done from n – benzene, chloroform mixture (40:60, v/v).

Crystals obtained (7.1 mg)

Figure a

UV absorption property of the isolated compound

Distilled water (100 ml) was added to 10 mg of the isolated compound. The solution was filtered and the filtrate was processed in a spectrophotometer for UV ray absorption at the ranges of 200-400 nm at 10 nm intervals.

Results and Discussion

Isolation of the compound

Brown coloured compound was isolated.

UV absorption property of the isolated compound

Isolated compound absorbed UV ray in all wave lengths of UV region. Absorptions at 400 nm, 350 nm, 300 nm, 250 nm and 200 nm were, 0.37, 0.51, 0.69, 0.95 respectively.. Maximum absorption, however, was noted at 200 nm (1.6). Results are summarized in figure 2.

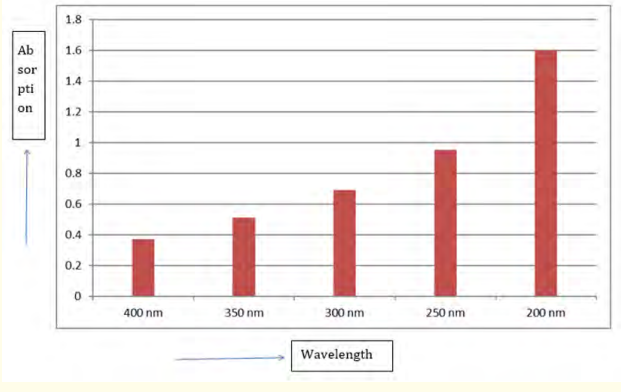

Figure 2: UV radiation absorption by the isolated compound from *S. cumini* L. leaves.

Ultraviolet radiation is non-ionizing radiation. It falls under 180 – 400 nm wavelength region of electromagnetic spectrum. Depending on wavelength ultraviolet radiation is divided into three categories: UV – A, UV – B and UV – C. UV-A having the longest wavelength 315-400 nm, known as black light, has least energetic photons. On the other hand, UV – C having the shortest wavelength 100 – 280 nm, known as germicidal has highest energetic photons. UV – B, having wavelength 281-314 nm, known as erythemal, however, falls in the intermediate category. Ultraviolet radiation also generates from laboratory instruments like germicidal lamps, biological safety cabinets, cross linkers, lasers, trans illuminators etc. However, the major source of UV ray is solar radiation or sunlight [12].

Solar UV-radiation has good effect on humans. It is required for cutaneous synthesis of vitamin D. This synthesis covers almost 90% of the vitamin D requirement of human body. UV radiation has bad effect too and the effects are plenty. These include skin and eye injury, genetically determined photo sensitivities, photosensitivity reactions to ingested drugs, etc. It has been observed that if a person is under excessive exposure to UV rays then it causes atrophy, wrinkling, pigmentary changes and malignancy. Three types of skin cancer may develop. These are squamous cell carcinoma, basal cell carcinoma and malignant melanoma. Eye is also affected. UV radiation can cause injury to cornea and there is painful inflammation of eye. If eye gets chronic UV exposure, it can lead to the formation of cataracts. It was also observed that over-exposure to UV radiation can change the distribution and function of WBC in humans causing harmful suppressing effect on the immune system [13].

Therefore, identification of sources to absorb UV radiation from the environment is needed for human protection. Efforts are going on. Research in this direction has been extended even in the field of medicinal plants. Several medicinal plants like *Phyllostachys pubescens, Calotropis gigantea, Mentha piperita, Azadirachta indica, Carica papaya, Lycopersicon esculantum, Aloe vera, Oscimum sanctum*, etc. are now known to have anti solar activity [14,15].

In the present study we have isolated a compound from *S. cumini* L. leaves. The compound can absorb UV radiation in all wavelength region but maximum absorption was at found 200 nm. The compound now needs characterization. Work in this direction is presently going on in our laboratory.

Conclusion

In the present study we found UV radiation absorption property of the isolated compound from *S. cumini* L. leaves. The property may be utilized in future to protect humans from UV radiation.

Recommendation

Isolated compound from *S. cumini* L. leaves may be used in preparation of sunscreen lotion as UV absorbing material.

Acknowledgements

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Conflict of interest

Nil

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