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PHYTOCHEMICALS AND PHARMACOLOGICAL PROPERTIES OF *ADENIUM OBESUM*: A REVIEW

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ABSTRACT:

Plants and their exudates have long been used more and more in traditional medical systems including ayurveda, acupuncture, homoeopathy, and aromatherapy. Traditional derived organic medicine is well recognised to be used by many individuals to treat a range of ailments because of its low cost and few side effects. The review was based on the phytochemicals and pharmacological properties of *adenium obesum*. Though they were first discovered in Africa, species of *Adenium obesum* are now widespread in practically all tropical and subtropical nations. The chosen plant species are found in Asia as well as in Africa. 53 compounds in all were isolated and identified in earlier studies of the selected plant by different authors. While certain have biological properties like antiviral, anticancer, and cytotoxic impact, others are toxic. Few studies have been done in Gulf countries on the chosen local medicinal plant. The chemical components of the bark and stem were betulin and rosmarinic acid. While leaves confirmed for several chemical components, such as Honghelin, Obeside-B & C, the stem exhibited 3,5,7,3,4,5-Hexahydroxy flavone and 5,7,3,4-Tetrahydroxy flavone. It Concluded that isolated compounds and crude plant extracts have a variety of biological effects, including possible effects on the heart and immune system as well as antibacterial, anti-influenza, anticancer, antiviral, Trypanocides, larvicidal, as piscicide, and molluscicide qualities.

Keywords: *Adenium obesum*, phytochemicals, pharmacological properties, antioxidant, anticancer.



INTRODUCTION

Plants and their exudates have long been used more and more in traditional medical systems including ayurveda, acupuncture, homoeopathy, and aromatherapy. Traditional derived organic medicine is well recognised to be used by many individuals to treat a range of ailments because of its low cost and few side effects [1]. The main biological source of secondary metabolic chemicals that are useful in treating a variety of diseases remains plants. Numerous naturally occurring substances that exhibit biological activity for human health and have a great potential to be developed into novel medications have been around for a very long time. Natural occurring antibacterial substances are becoming more and more important in plant chemotherapy [3]. Preservation of human and community health depends on the usage of medicinal plants. Numerous chemical substances found in plants have physiological impacts on humans, hence many of them have great medical potential. Among the many chemical constituents of medicinal plants are lipids, oils, sesquiterpenes, alkaloids, flavonoids, glycosides, saponins, resins, oleoresins, and phenolic compounds [4]. The World Health Organisation states that therapeutic plants can be processed to produce semi-synthetic chemical drugs. Approx. 80% of people on earth use Ayurvedic and other herbal-based alternative health systems. Finding novel medications from natural sources is considered to be crucial even with all of the developments in contemporary medicine. Evaluation of different plant products based on their traditional usage and medicinal value depending on their therapeutic efficacy results in the creation of modern and contemporary medications for treating different disorders. An increasing concern is antibiotic resistance. Many of the currently in use antibacterials have side effects including toxicity, hypersensitivity, immunological suppression, and tissue residues that may be dangerous to public health [5].

Though they were first discovered in Africa, species of *Adenium obesum* are now widespread in practically all tropical and subtropical nations. The chosen plant species are found in Asia as well as in Africa (Ethiopia, Kenya, Senegal, Somalia, Sudan & Tanzania). Of the selected plant, there are various species in Oman. In the Sultanate of Oman, for instance, grows the desert rose. All of the parts of the particular species are used as medicine to treat different diseases. The selected plant species are grown commercially all over the world because of their therapeutic qualities [6].

There are six synonyms available globally i.e., *Adenium multiflorum*; *Adenium obesum*; Desert rose; Impala lily; Kudu lily; Mock azalea [7]. However, only 2 names are available in the southern part of the Sultanate of Oman.

Taxonomy

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Gentianales

Family: Apocynaceae

Genus: *Adenium*

Species: *obesum*



Fig 1. Depiction of whole plant of *Adenium obesum*

Phytochemicals

A complete AO plant growing locally was found to contain a variety of chemicals, the amount of which rising with age [8]. The selected plant contained, among other chemical compounds, carbohydrates, flavonoids, cardiac glycoside, flavonoid, terpenoids, and pregnanes, according to the phytochemical study. The most of the isolated chemical components of the chosen plant were physiologically active [9]. 53 compounds in all were isolated and identified in earlier studies of the selected plant by different authors. While

certain have biological properties like antiviral, anticancer, and cytotoxic impact, others are toxic [10]. Few studies have been done in Gulf countries on the chosen local medicinal plant. The chemical components of the bark and stem were betulin and rosmarinic acid. While leaves confirmed for several chemical components, such as Honghelin, Obeside-B & C, the stem exhibited 3,5,7,3,4,5-Hexahydroxy flavone and 5,7,3,4-Tetrahydroxy flavone [11].

Traditional uses

It has following traditional uses [12][13].

- The cure of sexual disorders is the main use of the paste of the entire plant in Omani tradition.
- The lotion is used to treat a number of skin disorders and get rid of lice after being separated from the bark and root.
- The white latex from this plant works wonders to heal tooth decay and infected wounds.
- The separated latex of the native plant species is used as a pesticide since it is toxic.
- The Somalians use it, however, to treat sinus infections.
- Kenyans use white latex to treat lice and powdered stem to kill skin parasites on camels and cattle.
- The bark is a helpful anti-abortion as well.
- Nigerians use the entire plant for anti-plasmodial, anti-trypanosomal, and anti-leishmanial uses as well.
- Omanis have historically used it to treat headaches, skin disorders, wounds, and joint and muscular pain.

Pharmacological properties

The unusual long-leaved plant species selected is found in the Sultanate of Oman and most Gulf countries. Plants have many chemical types with different biological purposes. In the Gulf area, the herb is utilised to heal several ailments. Traditionally, the Omani people have used different parts of the selected plant to treat lice, headaches, muscle aches, joint discomfort, and skin issues. Apart from that, the plant showed noteworthy antibacterial, antioxidant, anti-plasmodial, anti-trypanosomal, and anti-leishmanial effects [15][16].

➤ **Antioxidant, anti-cancer and anti-inflammatory**

The significant phytochemical components by gas chromatography-mass spectrometry (GC–MS) analysis of ethanolic extracts of *A. obesum* (AOE) were investigated. 26 phytochemical substances were identified by the GC–MS study of AOE. Traditionally, several illnesses have been treated using this plant. In this work, the antioxidant, anti-inflammatory, and anticancer properties of ethanolic leaf extract from *A. obesum* (AOE) were investigated. DPPH, ABTS, superoxide, hydroxyl radical scavenging, and prevention of lipid peroxidation were among the antioxidant assays used to investigate the antioxidant properties of the ethanolic extract of

AOE. Several AOE reaction combinations' antioxidant properties were compared to ascorbic acid, a reference or standard antioxidant. AOE was also shown to be cytotoxic against A549 lung cancer cells in our evaluation of its anticancer activities. Through generating nuclear condensation and fragmentation, AOE was shown to reduce the viability of A549 lung cancer cells. Moreover, ethanolic AOE proved to be an anti-inflammatory agent in an in vitro model system of murine alveolar macrophages (J774A.1). Proinflammatory cytokines and TNF- α are two examples of inflammatory mediators whose levels may be decreased by AOE. The antioxidant, anticancer, and anti-inflammatory properties of AOE were demonstrated by the results of the current study, which might explain later research on the development of herbal-based medications [17].

➤ **Antibacterial**

The antibacterial activity of the isolated pure chemicals and crude extracts was assessed using our well-established disc diffusion technique. All the generated crude extracts and separated plant components showed some antibacterial activity in the 0–13 mm range. With regard to *E. Coli*, the different extracts and pure separated plant components had a mild antibacterial effect. This could clarify the various bioactive substances and the way solvent polarity affects their bioactivity. Rosmarinic acid from several plant species extracted in its pure form has shown to have maximum activity [18]. Antibacterial effects of *Adenium obesum* have been demonstrated against several bacterial species. Among the hospital-borne pathogenic bacterial strains that the aqueous extract of *A. obesum* (stem bark) effectively inhibits are *P. mirabilis*, *P. aeruginosa*, *S. aureus*, and *E. coli*. Three pathogenic Gram-negative bacteria strains that were successfully inhibited by methanolic and petroleum ether bark extracts of *A. obesum* are *S. typhi* and *E. coli* and *N. gonorrhoea* [19].

According to a different study, *Pseudomonas aeruginosa* and *Escherichia coli* are resistant to the antibacterial properties of a methanolic extract of *A. obesum* leaves, whereas *S. aureus* and *B. amyloliquefaciens* are not [20]. Their study indicates that the leaves of the *A. obesum* plant are a potent antibacterial agent that can be applied to a range of infectious diseases [21].

➤ **Trypanocides**

An *Adenium obesum* methanol AO extract (stem, bark) shown notable trypanocidal activity against *Trypanosoma brucei*. At 4 mg/ml, methanol extracts of *A. obesum* stem bark inhibited the in vitro motility of *T. brucei* by 50% [22].

➤ **Anticancer**

After years of thorough study, a number of bioactive chemicals from *Adenium obesum* were shown to both prevent and treat cancer. The human nasopharyngeal epidermoid carcinoma was used as a test organ for the cytotoxicity of the aerial part ethanol extract of *A. obesum*. The bioactive components of the extract were identified as Quercetin bis(O-methyl) [23] and

the cardenolides somalin, honghelin, and hongheloside A. Undiluted extracts of showed very significant cytotoxicity against two colon cancer cell lines. We isolated two pregnant women from the leaves of *A. obesum* with cytotoxic properties against P388/S cells for murine leukaemia [24].

➤ **Larvicidal**

Promising larvicidal effect of *Adenium obesum* tuber dichloromethane extract against *Aedes aegypti* mosquito larvae, the vector of yellow fever and dengue hemorrhagic fever [25].

➤ **As acaricide**

The ticks *Boophilus* and *Amblyomma* were effectively killed by an aqueous stem bark preparation of *Adenium obesum* [26]

➤ **As piscicide**

Aquaculture ponds can be managed against some undesirable weeds and predatory aquatic critters by using plant extract to protect native species and/or the intended fish species that have been supplied [27]. Before adding desired fish species to an aquaculture pond, researchers investigated the use of an ethanol extract of *Adenium obesum* stem bark. Fish given plant extracts exhibited behavioural changes, including respiratory distress, adaptive reactions, neurological damage, and in some cases, death [28].

➤ **Antiviral**

In vitro anti-influenza viral activity of methanolic extracts of *Adenium obesum* was demonstrated using influenza virus A/PR/8/34 (H1N1). The isolated active component was identified to be oleandrigenin-Dglucosyl (14)-Ddigitalose [29].

➤ **Molluscicidal**

Methanol extracts of *Adenium obesum* may be used to control the snail *Bulinus truncatus* since they inhibit the snail's biochemistry and physiology at sublethal quantities [7].

CONCLUSION

Traditionally, Oman used the herb largely to cure sexually transmitted diseases. Long leaves of this plant thrive best on sandy, rocky, and steep terrain. It was estimated from the literature that the chosen plant contained about 53 chemicals. The several isolated chemicals and crude extracts of various polarity from various regions of the chosen plant showed a variety of mild biological activity. It Concluded that isolated compounds and crude plant extracts have a variety of biological effects, including possible effects on the heart and immune system as well as antibacterial, anti-influenza, anticancer, antiviral, Trypanocides, larvicidal, as piscicide, and molluscicidal qualities. Omani people have traditionally utilised the plant to cure headaches, skin and wound issues, joint and muscle aches, and other conditions.

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CONFLICT OF INTEREST

Authors declared for none 'conflict of interest'.

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