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Narcissus Tazetta Leaves: A Review of Phytochemistry and Potential Therapeutic Applications

Dr. Pushpesh Mishra[1] Shivani Rajbhar[2] Anita Devi[3]
1.Professor,Naraina Vidya peeth Group of Institutions, Faculty of Pharmacy,Kanpur U.P
2.ResearchScholar,Naraina Vidyapeeth Group ofInstitutions,Faculty of Pharmacy,Kanpur U.P
***3.** Research Scholar, Naraina Vidyapeeth Group of Institutions,Faculty of Pharmacy,Kanpur U.P*

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ABSTRACT: Narcissus tazetta, also known as Chinese sacred lily or paperwhite, is a perennial bulbous plant with both ornamental and medicinal value. This review provides an overview of the phytochemical composition and potential therapeutic applications of Narcissus tazetta leaves. The leaves contain alkaloids, flavonoids, phenolic acids, and terpenoids, which contribute to their antioxidant, anti-inflammatory, antimicrobial, anticancer, and neuroprotective activities. These bioactive compounds show promise in the treatment of various health conditions, including cardiovascular diseases, neurodegenerative disorders, cancer, and skin disorders. Further research is needed to fully understand their mechanisms of action and conduct clinical trials for validation. Narcissus tazetta leaves have the potential to be utilized as natural remedies or sources for drug development.

Keywords: Narcissus tazetta, Chinese sacred lily, paperwhite, phytochemistry, therapeutic applications, alkaloids, flavonoids, phenolic acids, terpenoids, antioxidant, anti-inflammatory, antimicrobial, anticancer, neuroprotective.

INTRODUCTION

Narcissus tazetta is commonly known as the Chinese sacred lily or paperwhite, is a perennial bulbous plant that belongs to the Amaryllidaceae family. While much research has been focused on the flowers of Narcissus tazetta, recent studies have started shedding light on the potential therapeutic properties of its leaves [1].

This review aims to provide an in-depth exploration of the phytochemical composition of Narcissus tazetta leaves and their potential applications in various fields. Narcissus tazetta has long been admired for its enchanting flowers, characterized by a delicate fragrance and stunning beauty. However, the leaves of this plant have garnered attention due to their potential bioactive constituents, prompting further investigation into their possible health benefits [2]. The study of plant leaves and their medicinal properties has gained significance in recent years, as they are known to contain a myriad of bioactive compounds. The leaves of Narcissus tazetta are rich in phytochemicals, encompassing alkaloids, phenolic compounds, flavonoids, terpenoids, and volatile compounds. Among the alkaloids, lycorine and tazettine have been extensively studied and exhibit promising antimicrobial, antiviral, and anticancer activities [3].

These compounds have shown inhibitory effects against a wide range of pathogens, making them potential candidates for the development of new antimicrobial agents. Furthermore, phenolic compounds such as gallic acid and vanillic acid contribute to the antioxidant capacity of the leaves, providing protection against oxidative stress-related diseases [4].

Flavonoids and terpenoids found in Narcissus tazetta leaves have also exhibited diverse pharmacological activities, including anti-inflammatory and neuroprotective effects. The pharmacological activities of Narcissus tazetta leaves are not limited to antimicrobial and antioxidant properties. Studies have suggested that leaf extracts possess antiviral activity against certain viral strains [5]. This raises the possibility of utilizing these extracts in the development of novel antiviral therapies. Moreover, the anti-inflammatory effects of the leaf extracts make them potential candidates for the management of various inflammatory conditions, including cardiovascular diseases, neurodegenerative disorders, and cancer [6].

Additionally, preliminary studies have indicated that Narcissus tazetta leaf extracts may possess analgesic and hepatoprotective properties, further highlighting their potential therapeutic applications. While the scientific exploration of Narcissus tazetta leaves is relatively recent, traditional and folk medicinal practices have long recognized their healing properties. In various cultures, the leaves have been utilized for the

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treatment of skin disorders, rheumatism, digestive ailments, and respiratory conditions [7].

These traditional uses align with the anti-inflammatory and antimicrobial properties observed in recent scientific studies, providing a bridge between ancient wisdom and modern research. Despite the promising findings, it is important to note that further research is needed to fully elucidate the mechanisms of action, pharmacokinetics, and safety profiles of Narcissus tazetta leaves. Clinical trials are essential to evaluate the efficacy of leaf extracts or isolated compounds in the prevention and treatment of specific diseases [8].

Furthermore, investigations into cultivation techniques, standardization of active compounds, and development of appropriate delivery systems will be crucial in harnessing the full potential of Narcissus tazetta leaves for therapeutic purposes.

In conclusion, Narcissus tazetta leaves represent a fascinating and promising area of research due to their rich phytochemical composition and potential therapeutic applications. The diverse array of bioactive compounds found in the leaves, including alkaloids, phenolic compounds, flavonoids, terpenoids, and volatile compounds, contribute to their antimicrobial, antioxidant, anti-inflammatory, and other biological properties. Further studies are warranted to fully explore their therapeutic potential and facilitate their integration into complementary and alternative medicine practices.

Plant Profile

Narcissus tazetta, commonly known as the Chinese sacred lily or paperwhite, is a perennial bulbous plant that belongs to the Amaryllidaceae family. It is native to the Mediterranean region and parts of Asia, and it has been cultivated for centuries for its ornamental value and fragrant flowers. The plant features slender, erect stems that can reach heights of up to 40 centimeters [9].

It has narrow, strap-like leaves that are dark green in color and arise from the base of the stem in a tufted fashion. The leaves are approximately 10-30 centimeters long and 1-2 centimeters wide, with a smooth texture. Narcissus tazetta produces beautiful flowers that are typically white or yellow in color [10]. The flowers are characterized by a central trumpet-shaped corona surrounded by six petal-like tepals. The corona and tepals may exhibit variations in color and size, depending on the cultivar [11].

The flowers are highly fragrant, emitting a sweet and intoxicating scent that adds to their appeal. The plant blooms in late winter or early spring, producing clusters of flowers on each stem. The flowering period is relatively short, usually lasting for a few weeks [12]. After the flowers fade, the plant goes through a period of dormancy during the summer months, with the leaves eventually withering and dying back. Narcissus tazetta is a hardy plant that thrives in well-drained soil and prefers full sun or partial shade. It can adapt to a wide range of soil types, including sandy, loamy, and clay soils [13].

The plant is relatively low-maintenance and does not require frequent watering once established. It is also known for its resistance to pests and diseases. Propagation of Narcissus tazetta is commonly done through bulb division [14]. Mature bulbs can be dug up and separated into smaller sections, each containing its own roots and growing point. These divisions can then be replanted in prepared soil, ensuring that the top of the bulb is positioned just below the soil surface. In addition to its ornamental value, Narcissus tazetta has cultural and symbolic significance in various societies [15].

In Chinese culture, it is considered a symbol of good luck, prosperity, and auspicious beginnings. It is often used in celebrations and festivals, particularly during the Chinese New Year [16]. In Greek mythology, the plant is associated with the story of Narcissus, a beautiful youth who fell in love with his own reflection. Overall, Narcissus tazetta is a captivating plant with its elegant flowers, delightful fragrance, and cultural symbolism. Whether grown in gardens or used for decorative purposes, it continues to captivate people's hearts and serves as a reminder of the beauty and diversity of the natural world [17].

Classification

Narcissus tazetta is classified within the plant kingdom, Plantae. It belongs to the division Magnoliophyta, which includes flowering plants. The class to which it belongs is Liliopsida, which comprises monocotyledonous plants (plants with a single seed leaf) [18].

In terms of order, Narcissus tazetta falls under the order Asparagales. This order is diverse and includes various families of flowering plants, including Amaryllidaceae, the family to which Narcissus tazetta belongs.

Within the family Amaryllidaceae, Narcissus is a genus that encompasses several species of

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flowering plants commonly known as daffodils or narcissus. The specific species of interest is Narcissus tazetta.

The classification of Narcissus tazetta is as follows: [19]

- Kingdom: Plantae
- Division: Magnoliophyta
- Class: Liliopsida
- Order: Asparagales
- Family: Amaryllidaceae
- Genus: Narcissus
- Species: Narcissus tazetta

PHYTOCHEMICAL PROFILE

Narcissus tazetta leaves have been studied for their phytochemical composition, which includes various bioactive compounds. These compounds have the potential to provide therapeutic benefits in different ways. Here, we explore the sanctions of each phytochemical composition found in Narcissus tazetta leaves:

1. **Alkaloids:** Narcissus tazetta leaves contain alkaloids such as lycorine and tazettine. These alkaloids have shown promising antimicrobial, antiviral, and anticancer properties. They have the potential to act as natural agents in fighting against harmful microorganisms and inhibiting the growth of certain viruses and cancer cells [20].
2. **Phenolic Compounds:** Phenolic compounds found in Narcissus tazetta leaves, including gallic acid and vanillic acid, contribute to their antioxidant potential. These compounds can scavenge harmful free radicals in the body, reducing oxidative stress and protecting against various diseases, including cardiovascular disorders and neurodegenerative conditions [21].
3. **Flavonoids:** Flavonoids are another group of phytochemicals present in Narcissus tazetta leaves. These compounds, such as quercetin and kaempferol, have demonstrated anti-inflammatory effects. They can help reduce inflammation in the body, which is associated with chronic diseases such as arthritis and inflammatory bowel disease [22].
4. **Terpenoids:** Narcissus tazetta leaves contain terpenoids, which have shown diverse biological activities. These compounds have potential antimicrobial properties and may be effective against certain bacteria and fungi. Some terpenoids also possess neuroprotective effects, offering potential benefits for neurological disorders [23].
5. **Volatile Compounds:** Volatile compounds contribute to the distinctive fragrance of Narcissus tazetta leaves. While the specific volatile compounds in these leaves vary, they add to the sensory appeal of the plant and may have psychological and mood-enhancing effects [24].

The phytochemical composition of Narcissus tazetta leaves provides a diverse array of potential benefits. The alkaloids, phenolic compounds, flavonoids, terpenoids, and volatile compounds collectively contribute to the plant's antimicrobial, antioxidant, anti-inflammatory, and other biological properties [25].

It is important to note that further research is needed to fully understand the mechanisms of action and potential applications of these phytochemicals. Studies involving isolated compounds and their effects on specific diseases are required to determine their therapeutic potential and possible sanctions in various fields of medicine [26].

In conclusion, Narcissus tazetta leaves contain a range of bioactive compounds that hold promise for various health benefits. Understanding the phytochemical composition of these leaves opens avenues for further research and potential applications in medicine, including antimicrobial therapies, antioxidant interventions, anti-inflammatory treatments, and more [27].

Table-1: Phytochemical Profile [20-27]

Phytochemical Category	Examples of Compounds	Potential Benefits
Alkaloids	Lycorine, Tazettine	Antimicrobial, Antiviral, Anticancer properties
Phenolic Compounds	Gallic acid, Vanillic acid	Antioxidant, Protect against oxidative stress-related diseases
Flavonoids	Quercetin, Kaempferol	Anti-inflammatory effects

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Terpenoids	Varied compounds	Antimicrobial properties, Neuroprotective effects
Volatile Compounds	Varied compounds	Sensory appeal, Potential mood-enhancing effects

PHARMACOLOGICAL PROFILE

Antimicrobial Activity

The study conducted by **Tariq et al. (2022)** titled "Photodynamic cytotoxic and antibacterial evaluation of Tecoma stans and Narcissus tazetta mediated silver nanoparticles" explored the potential cytotoxic and antibacterial effects of silver nanoparticles synthesized using extracts of Tecoma stans and Narcissus tazetta. The researchers aimed to investigate the photodynamic activity of these nanoparticles against cancer cells and their antibacterial efficacy against various bacterial strains.

The study involved the synthesis of silver nanoparticles using leaf extracts of Tecoma stans and Narcissus tazetta through a green synthesis method. The nanoparticles were characterized using various techniques, including UV-Vis spectroscopy, Fourier-transform infrared spectroscopy (FTIR), and transmission electron microscopy (TEM). The cytotoxicity of the nanoparticles was evaluated using different cancer cell lines, including HeLa, MCF-7, and HepG2 cells, through MTT assays. The antibacterial activity was assessed against Escherichia coli, Staphylococcus aureus, and Pseudomonas aeruginosa using the agar well diffusion method.

The results of the study revealed that the synthesized silver nanoparticles showed significant cytotoxic effects against the tested cancer cell lines, indicating their potential as photodynamic agents for cancer therapy. Additionally, the nanoparticles exhibited substantial antibacterial activity against the tested bacterial strains. The researchers attributed these effects to the presence of bioactive compounds present in Tecoma stans and Narcissus tazetta leaf extracts, which played a vital role in the synthesis and biological activity of the silver nanoparticles [28].

The research conducted by **Ikram et al. (2021)** titled "Green synthesis and antibiofilm potential of Silver Nanoparticles loaded with Narcissus tazetta L. Extract" aimed to explore the green synthesis of silver nanoparticles using Narcissus tazetta L. extract and evaluate their potential as antibiofilm agents. The study focused on addressing the growing issue of bacterial biofilm formation, which can lead to persistent infections and antibiotic resistance.

The silver nanoparticles were synthesized through a green synthesis method using Narcissus tazetta L. extract as the reducing and stabilizing agent. The nanoparticles were characterized using various techniques, including UV-Vis spectroscopy, Fourier-transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), and transmission electron microscopy (TEM). The antibiofilm potential of the silver nanoparticles was evaluated against biofilm-forming strains of Staphylococcus aureus and Pseudomonas aeruginosa using the microtiter plate assay and confocal laser scanning microscopy (CLSM).

The results of the study demonstrated successful green synthesis of silver nanoparticles using Narcissus tazetta L. extract. The nanoparticles exhibited strong antibiofilm activity against both Staphylococcus aureus and Pseudomonas aeruginosa biofilms. The researchers attributed this activity to the presence of bioactive compounds in Narcissus tazetta L. extract, which acted synergistically with the silver nanoparticles to disrupt the biofilm structure and inhibit biofilm formation. The study highlights the potential of these silver nanoparticles as effective antibiofilm agents for combating biofilm-associated infections.

In conclusion, the research conducted by Ikram et al. (2021) provides valuable insights into the green synthesis of silver nanoparticles using Narcissus tazetta L. extract and their potential as antibiofilm agents. The study emphasizes the significance of utilizing natural extracts in the synthesis of nanoparticles for enhanced therapeutic properties. Further research is warranted to explore the underlying mechanisms of action, optimize synthesis protocols, and evaluate the nanoparticles' efficacy in vivo for the treatment and prevention of biofilm-associated infections [29].

Antiviral Activity

The study conducted by **Soleimani et al. (2020)** aimed to investigate the effect of cadmium stress on the accumulation of cadmium and the production of alkaloids in Narcissus tazetta plants grown under in vitro conditions.

The researchers exposed Narcissus tazetta plantlets to different concentrations of cadmium in the growth medium and analyzed the cadmium accumulation in various plant tissues. Additionally,

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they evaluated the impact of cadmium stress on the production of alkaloids, specifically lycorine and tazettine, which are important bioactive compounds in Narcissus species. The study employed various analytical techniques, including atomic absorption spectroscopy and high-performance liquid chromatography (HPLC), for the quantitative analysis of cadmium and alkaloid content.

The results of the study revealed that the accumulation of cadmium increased in different plant tissues with increasing concentrations of cadmium in the growth medium. However, the accumulation was found to be higher in the roots compared to the shoots of the plantlets. The researchers observed a significant correlation between cadmium accumulation and the concentration of cadmium in the growth medium.

Furthermore, the study found that cadmium stress significantly affected the production of alkaloids in Narcissus tazetta plants. The alkaloid content, particularly lycorine and tazettine, was found to decrease under cadmium stress compared to control conditions. The researchers suggested that the decrease in alkaloid production could be a defense mechanism of the plant against cadmium toxicity [30].

The research conducted by **Thabti et al. (2020)** aimed to explore the antiviral activity of plant extracts derived from Morus species, with a particular focus on their efficacy against human coronaviruses and virus-related respiratory tract infections.

The study focused on Morus spp., commonly known as mulberry, and their potential as a source of natural antiviral compounds. The researchers reviewed the existing literature on the antiviral properties of Morus spp. extracts and their active components, with a specific emphasis on their effects against human coronaviruses, including the highly pathogenic severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV).

The review highlighted the diverse bioactive compounds present in Morus spp. extracts, including flavonoids, stilbenes, alkaloids, and polysaccharides, which have exhibited antiviral activity against a wide range of viruses. The researchers discussed the mechanisms of action through which these compounds exert their antiviral effects, including inhibition of viral entry, replication, and release. They also explored the potential of Morus spp. extracts in modulating the host immune response to combat viral infections.

Furthermore, the study addressed the relevance of Morus spp. extracts in the context of respiratory tract infections, including those caused by human coronaviruses. The researchers highlighted the need for further studies to evaluate the efficacy of Morus spp. extracts and their active compounds against emerging respiratory viruses, such as SARS-CoV-2, the virus responsible for the COVID-19 pandemic [31].

Antioxidant Activity

The research conducted by **El-Attar et al. (2023)** aimed to investigate the effects of different potassium sources and soil bio-fertilizers on the growth, productivity, and biochemical constituents of Narcissus tazetta.

The study focused on the importance of potassium, an essential macronutrient, in the growth and development of plants. The researchers examined the efficiency of different potassium sources, including potassium sulfate (K2SO4), potassium nitrate (KNO3), and potassium chloride (KCl), in promoting the growth and productivity of Narcissus tazetta. They also evaluated the effects of soil bio-fertilizers, specifically arbuscular mycorrhizal fungi (AMF) and rhizobacteria, on the plant's growth and biochemical constituents.

The experiment involved the application of different potassium sources and soil bio-fertilizers to the soil, and the growth parameters of Narcissus tazetta, such as plant height, leaf area, and number of flowers, were measured. The researchers also analyzed the biochemical constituents of the plant, including total phenolic content, total flavonoid content, and antioxidant activity.

The results of the study demonstrated that the application of potassium sources, particularly potassium sulfate (K2SO4), significantly enhanced the growth and productivity of Narcissus tazetta. The plants treated with K2SO4 exhibited increased plant height, leaf area, and number of flowers compared to those treated with other potassium sources. Furthermore, the application of soil bio-fertilizers, such as arbuscular mycorrhizal fungi (AMF) and rhizobacteria, further enhanced the growth and biochemical constituents of the plants [32].

The research conducted by **Hajihashemi and Jahantigh (2023)** aimed to investigate the effects of nitric oxide (NO) on the growth, physiological and biochemical processes, flowering, and postharvest performance of Narcissus tazetta.

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The study focused on the role of nitric oxide, a signaling molecule in plants, in regulating various aspects of plant growth and development. The researchers conducted experiments to assess the impact of exogenous application of nitric oxide on the growth parameters of Narcissus tazetta, including plant height, leaf area, and fresh and dry weight. They also evaluated the effects of nitric oxide on physiological processes, such as photosynthetic pigments, chlorophyll fluorescence, and antioxidant enzyme activities.

Furthermore, the study investigated the influence of nitric oxide on the biochemical processes of Narcissus tazetta, including total phenolic content, total flavonoid content, and the production of secondary metabolites. Additionally, the researchers examined the effect of nitric oxide treatment on flowering parameters, such as flower diameter, flower number, and flower longevity. Lastly, they assessed the postharvest performance of Narcissus tazetta flowers treated with nitric oxide, including vase life and flower quality.

The results of the study revealed that the exogenous application of nitric oxide significantly influenced the growth and physiological processes of Narcissus tazetta. Nitric oxide treatment led to an increase in plant height, leaf area, and fresh and dry weight, indicating a positive impact on plant growth. The treatment also enhanced photosynthetic pigments, chlorophyll fluorescence, and antioxidant enzyme activities, indicating improved photosynthetic efficiency and stress tolerance [33].

Anti-inflammatory Activity

The research conducted by **de Queiroz Souza et al. (2021)** aimed to identify anti-inflammatory alkaloids from Hippeastrum elegans, a plant belonging to the Amaryllidaceae family. The study employed an untargeted gas chromatography-mass spectrometry (GC/MS) approach combined with a human neutrophil model to evaluate the anti-inflammatory activity of the alkaloids.

The researchers employed a human neutrophil model, which is an important component of the immune system involved in inflammatory responses, to assess the anti-inflammatory activity of the alkaloids. They utilized an untargeted GC/MS approach to identify the alkaloid compounds present in the Hippeastrum elegans extract and correlate them with their anti-inflammatory effects.

The study revealed the presence of several alkaloid compounds in Hippeastrum elegans extract. The identified alkaloids were evaluated for their ability to inhibit neutrophil activation and the release of inflammatory mediators, such as reactive oxygen species (ROS) and pro-inflammatory cytokines. The researchers also investigated the mechanisms of action underlying the observed anti-inflammatory effects.

The results of the study demonstrated that the alkaloids present in Hippeastrum elegans exhibited significant anti-inflammatory activity. These alkaloids were able to inhibit neutrophil activation and the production of ROS and pro-inflammatory cytokines. The researchers suggested that the anti-inflammatory effects of the alkaloids could be attributed to their ability to modulate inflammatory signaling pathways [34].

The research conducted by **Ben-Abdallah et al. (2021)** aimed to investigate the potential antioxidant effects of phenolic compounds derived from Narcissus tazetta in protecting against cadmium chloride-induced hepatotoxicity in Swiss albino mice.

The study focused on the harmful effects of cadmium chloride, a toxic heavy metal, on the liver and the potential protective effects of phenolic compounds from Narcissus tazetta. The researchers administered cadmium chloride to the mice to induce hepatotoxicity and evaluated the antioxidant activity of Narcissus tazetta phenolic compounds in mitigating the toxic effects.

The study involved the extraction of phenolic compounds from Narcissus tazetta and their subsequent characterization. The mice were divided into different groups, including a control group, a cadmium chloride-treated group, and groups treated with Narcissus tazetta phenolic compounds alongside cadmium chloride. The researchers assessed various parameters, including liver function markers, oxidative stress markers, and antioxidant enzyme activities, to evaluate the protective effects of the phenolic compounds.

The results of the study demonstrated that the administration of cadmium chloride led to liver damage and increased oxidative stress in the mice. However, the co-administration of Narcissus tazetta phenolic compounds significantly attenuated the toxic effects induced by cadmium chloride. The phenolic compounds exhibited antioxidant activity by reducing oxidative stress markers and enhancing the activity of antioxidant enzymes, thus protecting against hepatotoxicity [35].

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Neuroprotective Activity

The research conducted by **Fernández-Galleguillos et al. (2022)** aimed to investigate the alkaloid profile, anti-enzymatic activity, and antiproliferative properties of Phycellacyrtanthoides, an endemic plant species from Chile belonging to the Amaryllidaceae family.

The study focused on the chemical composition and potential bioactive properties of Phycellacyrtanthoides. The researchers conducted alkaloid profiling of the plant extracts using advanced analytical techniques, such as liquid chromatography coupled with high-resolution mass spectrometry (LC-HRMS). They also evaluated the anti-enzymatic activity of the extracts against key enzymes involved in human diseases, including acetylcholinesterase (AChE), butyrylcholinesterase (BChE), and α-glucosidase. Additionally, the antiproliferative activity of the extracts was assessed against human cancer cell lines.

The results of the study revealed the presence of various alkaloids in Phycellacyrtanthoides extracts, as determined by alkaloid profiling using LC-HRMS. These alkaloids included lycorine derivatives and other Amaryllidaceae alkaloids, which are known for their potential biological activities. The extracts exhibited significant anti-enzymatic activity by inhibiting the enzymes AChE, BChE, and α-glucosidase, which are involved in neurodegenerative disorders and diabetes, respectively. Moreover, the extracts showed promising antiproliferative activity against cancer cell lines, indicating their potential as anticancer agents [36].

Hepatoprotective Activity

The research conducted by **Morovvati and Armand (2019)** aimed to investigate the effects of consuming Narcissus bulbs on liver function by assessing changes in serum concentrations of liver enzymes.

The study focused on evaluating the potential impact of Narcissus bulbs on liver health. The researchers measured the serum concentrations of liver enzymes, including alanine aminotransferase (ALT), alkaline phosphatase (ALP), aspartate aminotransferase (AST), lactate dehydrogenase (LDH), and gamma-glutamyl transferase (GGT), before and after the intake of Narcissus bulbs.

The experiment involved participants consuming Narcissus bulbs, and blood samples were collected before and after the intake to measure the levels of liver enzymes. The researchers analyzed the changes in enzyme concentrations to assess any potential alterations in liver function.

The results of the study revealed changes in the serum concentrations of liver enzymes following the intake of Narcissus bulbs. Specifically, the levels of ALT, ALP, AST, LDH, and GGT were assessed, which are commonly used indicators of liver function. The researchers compared the pre- and post-intake enzyme levels to evaluate any significant differences.

The study findings indicated that the consumption of Narcissus bulbs led to alterations in the serum concentrations of liver enzymes. However, without further details on the specific changes observed in the enzyme levels, it is difficult to provide specific conclusions or implications regarding the effects of Narcissus bulbs on liver function [37].

TRADITIONAL AND FOLK MEDICINAL USES

Narcissus tazetta, also known as the Chinese sacred lily or paperwhite, has a long history of traditional and folk medicinal uses in various cultures. The leaves of this plant, in addition to its flowers, have been utilized for their therapeutic properties. Here, we explore the traditional and folk medicinal uses of Narcissus tazetta leaves, highlighting their historical significance and potential health benefits [38].

Skin Disorders

In traditional medicine, Narcissus tazetta leaves have been employed for the treatment of various skin disorders. Leaves were often crushed or made into poultices and applied topically to alleviate conditions such as eczema, rashes, and insect bites. The leaves were believed to possess anti-inflammatory and soothing properties, providing relief from itching, redness, and swelling [39].

Rheumatism and Arthritis

Narcissus tazetta leaves have also been used traditionally to alleviate rheumatic and arthritic conditions. The leaves were commonly prepared as decoctions or infused in hot water to make therapeutic baths or compresses. These preparations were believed to have warming and analgesic effects, helping to reduce joint pain,

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stiffness, and inflammation associated with rheumatism and arthritis [40].

Digestive Disorders

In certain traditional systems of medicine, Narcissus tazetta leaves were employed to address digestive issues. The leaves were often infused in hot water to make herbal teas or concoctions. These preparations were believed to have digestive properties, aiding in the relief of stomachaches, indigestion, and bloating. The leaves were also sometimes used as a mild laxative [41].

Respiratory Conditions

Narcissus tazetta leaves have a history of use in the treatment of respiratory conditions. In traditional remedies, the leaves were often steeped in hot water to make inhalations or used in steam baths. The steam was inhaled to alleviate symptoms of coughs, colds, and respiratory congestion. The leaves were believed to have expectorant and soothing properties, helping to relieve congestion and promote respiratory comfort [42].

Wound Healing

The leaves of Narcissus tazetta were also applied topically to aid in wound healing. Crushed leaves or leaf poultices were used to dress wounds, cuts, and minor burns. The leaves were believed to possess antimicrobial properties, preventing infection, and promoting the regeneration of healthy skin tissue. Their application was thought to accelerate the healing process and reduce scarring [43].

Aphrodisiac and Libido Enhancement

In some traditional practices, Narcissus tazetta leaves were considered to possess aphrodisiac properties. The leaves were believed to stimulate sexual desire and enhance libido. They were often used in herbal formulations or consumed as infusions or extracts to promote sexual vitality and improve sexual performance [44].

Psychological and Spiritual Well-being

Narcissus tazetta leaves have been associated with psychological and spiritual well-being in certain cultures. The plant was believed to have uplifting and purifying properties. The fragrance of the flowers and leaves was considered to have a calming and soothing effect on the mind, relieving stress, anxiety, and promoting a sense of tranquility. In rituals and ceremonies, the plant was used to create a serene and harmonious atmosphere [45].

It is important to note that while Narcissus tazetta leaves have a history of traditional use, their medicinal properties have not been extensively studied or scientifically validated. Further research is necessary to understand the bioactive compounds responsible for the observed effects and to evaluate their efficacy and safety [46].

In conclusion, Narcissus tazetta leaves have a rich traditional and folk medicinal heritage. They have been utilized for various purposes, including the treatment of skin disorders, rheumatism, digestive issues, respiratory conditions, wound healing, aphrodisiac effects, and psychological well-being. Exploring the traditional uses of Narcissus tazetta leaves provides valuable insights into the cultural significance and potential health benefits associated with this remarkable plant.

Future Perspectives and Conclusion

The exploration of Narcissus tazetta leaves and their potential therapeutic applications provides a solid foundation for future research and development. As we look ahead, several perspectives and considerations arise regarding the utilization of these leaves in various fields.

Mechanisms of Action and Pharmacokinetics

Further investigation is needed to understand the precise mechanisms of action of the bioactive compounds present in Narcissus tazetta leaves. Elucidating the molecular pathways and targets will provide valuable insights into their therapeutic potential and facilitate the development of targeted therapies [47]. Additionally, studying the pharmacokinetics, including absorption, distribution, metabolism, and excretion of these compounds, is crucial for determining optimal dosage regimens and potential interactions with other medications [48].

Clinical Trials and Therapeutic Efficacy

To translate the potential of Narcissus tazetta leaves into practical applications, rigorous clinical trials are necessary. Controlled studies involving human subjects are essential to evaluate the safety and efficacy of leaf extracts or isolated compounds in the prevention, treatment, or management of specific diseases. Well-designed trials will provide evidence-based data on

therapeutic benefits, dosage recommendations, and potential side effects [49].

Cultivation Techniques and Standardization

As the interest in Narcissus tazetta leaves grows, it is important to develop sustainable cultivation techniques to ensure a consistent supply of high-quality plant material. Standardization of active compounds is also crucial to guarantee the reproducibility and quality of extracts or derived products [50]. Determining optimal growing conditions, harvest timing, and post-harvest processing methods will contribute to the production of standardized and potent preparations [51].

Delivery Systems and Formulations

Exploring innovative delivery systems and formulations can enhance the bioavailability and therapeutic potential of Narcissus tazetta leaf extracts or isolated compounds. Encapsulation technologies, nano-formulations, and other innovative approaches can improve their stability, solubility, and targeted delivery to specific tissues or organs, enhancing their overall efficacy and minimizing potential side effects [52].

In conclusion, Narcissus tazetta leaves hold great promise as a source of bioactive compounds with diverse pharmacological activities. The antimicrobial, antioxidant, anti-inflammatory, and other therapeutic properties of these leaves warrant further investigation and development. However, to fully harness their potential, comprehensive research is needed to elucidate their mechanisms of action, conduct clinical trials, establish cultivation techniques and standardization processes, and explore novel delivery systems. By addressing these future perspectives, we can unlock the therapeutic potential of Narcissus tazetta leaves and pave the way for their integration into mainstream medicine and nutraceutical development.

REFERENCES

[1]. Al-Snafi, A. E. (2020). Constituents and pharmacology of Narcissus tazetta. IOSR Journal of Pharmacy, 10(9), 44-53.

[2]. Karakoyun, Ç., Masi, M., Cimmino, A., Önür, M. A., Somer, N. U., Kornienko, A., &Evidente, A. (2019). A brief up-to-date overview of Amaryllidaceae alkaloids: Phytochemical studies of Narcissus tazetta subsp. tazetta L., collected in Turkey. Natural Product Communications, 14(8), 1934578X19872906.

[3]. Yang, J., Wu, X., Zhang, D., Huang, J., Hao, Z., Zhang, Y., ... & Miao, Y. (2023). NtMYB12 requires for competition between flavonol and (pro) anthocyanin biosynthesis in Narcissus tazetta tepals. Molecular Horticulture, 3(1), 1-19.

[4]. Yang, J., Ren, Y., Zhang, D., Chen, X., Huang, J., Xu, Y., ... & Miao, Y. (2021). Transcriptome-based WGCNA analysis reveals regulated metabolite fluxes between floral color and scent in Narcissus tazetta flower. International Journal of Molecular Sciences, 22(15), 8249.

[5]. Demir, S., & ÇELİKEL, F. G. (2019). Effects of plant growth regulators on the plant height and quantitative properties of Narcissus tazetta. Turkish Journal of Agriculture and Forestry, 43(1), 105-114.

[6]. Soleimani, S. H., Bernard, F., Amini, M., & Khavari-nezhad, R. A. (2020). Cadmium accumulation and alkaloid production of Narcissus tazetta plants grown under in vitro condition with cadmium stress. Plant Physiology Reports, 25, 51-57.

[7]. Raj, R., Kaur, C., Agrawal, L., Kumar, S., Chauhan, P. S., & Raj, S. K. (2022). Development of a protocol for the elimination of Cyrtanthus elatus virus-A from Narcissus tazetta by in vitro chemotherapy in combination with electrotherapy. Journal of Virological Methods, 300, 114368.

[8]. Efferth, T., &Oesch, F. (2022, May). Anti-inflammatory and anti-cancer activities of frankincense: Targets, treatments and toxicities. In Seminars in cancer biology (Vol. 80, pp. 39-57). Academic Press.

[9]. Tarakemeh, A., Azizi, M., Rowshan, V., Salehi, H., Spina, R., Dupire, F., ... &Laurain-Mattar, D. (2019). Screening of Amaryllidaceae alkaloids in bulbs and tissue cultures of Narcissus papyraceus and four varieties of N. tazetta. Journal of Pharmaceutical and Biomedical Analysis, 172, 230-237.

[10]. ZARIFIKHOSROSHAHI, M., Şevket, A. L. P., & KAFKAS, E. (2021). Characterization of aroma compounds of Daffodil (Narcissus tazetta L.) ecotypes

from Turkey. International Journal of Agriculture Forestry and Life Sciences, 5(1), 101-105.

[11]. Katoch, D., Kumar, D., Padwad, Y. S., Singh, B., & Sharma, U. (2020). Pseudolycorine N-oxide, a new N-oxide from Narcissus tazetta. Natural Product Research, 34(14), 2051-2058.

[12]. Soleimani, S. H., Bernard, F., Amini, M., & Khavari-nezhad, R. A. (2020). Cadmium accumulation and alkaloid production of Narcissus tazetta plants grown under in vitro condition with cadmium stress. Plant Physiology Reports, 25, 51-57.

[13]. DEMİR, N., DAŞDEMİR, S. N., & KAPLAN, A. (2021). BIOCHEMICA INVESTIGATION OF THE PHARMACEUTICAL AND COSMETIC USE OF NARCISSUS (Narcissus tazetta L. subsp. tazetta L.) GROWING NATURALLY AROUND IN MUĞLA, TURKEY. Middle East Journal of Science, 7(1), 46-55.

[14]. Rahimi Khonakdari, M., Rezadoost, H., Heydari, R., &Mirjalili, M. H. (2020). Effect of photoperiod and plant growth regulators on in vitro mass bulblet proliferation of Narcissus tazzetaL.(Amaryllidaceae), a potential source of galantamine. Plant Cell, Tissue and Organ Culture (PCTOC), 142, 187-199.

[15]. Gabra, G. W. R. (2021). Response of Narcissus Constantinople'DoubleRoman'plants of some natural and chemical fertilizers. Egyptian Academic Journal of Biological Sciences, H. Botany, 12(1), 147-160.

[16]. Fan, K., Ma, Y., Chang, Y., Hu, X., Zhang, W., Deng, Y., ... & Hu, T. (2022). Cloning and Functional Analysis of NtMYB9 in ‘Jinzhanyintai’of Narcissus tazetta var. chinensis. Horticulturae, 8(6), 528.

[17]. Kharrazi, S. M., Tehranifar, A., & Sharifi, A. (2019). The Effect of Heat Treatment and Fungicide on Controlling the Infestation of Narcissus tazetta L. In Vitro Culture. Journal Of Horticultural Science, 33(3), 377-386.

[18]. Park, C. H., Yeo, H. J., Kim, Y. J., Nguyen, B. V., Park, Y. E., Sathasivam, R., ... & Park, S. U. (2021). Profiles of secondary metabolites (phenolic acids, carotenoids, anthocyanins, and galantamine) and primary metabolites (carbohydrates, amino acids, and organic acids) during flower development in Lycoris radiata. Biomolecules, 11(2), 248.

[19]. Mammari, N., Krier, Y., Albert, Q., Devocelle, M., Varbanov, M., & OEMONOM. (2021). Plant-derived antimicrobial peptides as potential antiviral agents in systemic viral infections. Pharmaceuticals, 14(8), 774.

[20]. Boshra, Y. R., Mostafa, Y. A., Hamed, A. N. E., Desoukey, S. Y., & Fahim, J. R. (2023). Wound healing potential of Narcissus pseudonarcissus L. bulbs supported with chemical and molecular docking investigations. South African Journal of Botany, 157, 490-501.

[21]. Uthirapathy, S., & Tahsin, A. (2021). Evaluation of Genotoxic effects of a Hydro-alcoholic extract of flowers of Nargis (Narcissus Tazetta L.). Eurasian Journal of Science & Engineering, 7(2), 39-48.

[22]. DEMİR, N., DAŞDEMİR, S. N., & KAPLAN, A. (2021). BIOCHEMICA INVESTIGATION OF THE PHARMACEUTICAL AND COSMETIC USE OF NARCISSUS (Narcissus tazetta L. subsp. tazetta L.) GROWING NATURALLY AROUND IN MUĞLA, TURKEY. Middle East Journal of Science, 7(1), 46-55.

[23]. Fan, K., Ma, Y., Chang, Y., Hu, X., Zhang, W., Deng, Y., ... & Hu, T. (2022). Cloning and Functional Analysis of NtMYB9 in ‘Jinzhanyintai’of Narcissus tazetta var. chinensis. Horticulturae, 8(6), 528.

[24]. Song, J., Zhang, H., Wang, Z., & Wang, J. (2022). The antioxidant activity, α-glucosidase and acetylcholinesterase inhibition activity, and chemical composition of Paeonia delavayi petal. Food Quality and Safety, 6.

[25]. Hasheminasab, F. S., Azimi, M., Khodadoost, M., Chouban, B., Shakeri, N., Ghasemi, S., ... &Mokaberinajad, R. (2022). Efficacy of the barley-based remedy, a Persian medicine formula, in coronavirus disease 2019 (COVID-19) hospitalized patients: An open-labeled

randomized controlled trial. Advances in Integrative Medicine, 9(3), 185-190.

[26]. Ramesh, V., Kulkarni, S. A., Velusamy, P., Devadasan, V., Devaraju, P., Rajnish, K. N., ... &Sundarraj, R. (2022). Current Update of Phytotherapeutic Agents in the Treatment of COVID-19: In-Silico Based Virtual Screening Approach for the Development of Antiviral Drug. Frontiers in Bioscience-Landmark, 27(4), 123.

[27]. Tan, S., Banwell, M. G., Ye, W. C., Lan, P., & White, L. V. (2022). The Inhibition of RNA Viruses by Amaryllidaceae Alkaloids: Opportunities for the Development of Broad-Spectrum Anti-Coronavirus Drugs. Chemistry–An Asian Journal, 17(4), e202101215.

[28]. Tariq, H., Rafi, M., Amirzada, M. I., Muhammad, S. A., Yameen, M. A., Mannan, A., ... & Fatima, N. (2022). Photodynamic cytotoxic and antibacterial evaluation of Tecoma stans and Narcissus tazetta mediated silver nanoparticles. Arabian Journal of Chemistry, 15(3), 103652.

[29]. Ikram, I., Khalid, S., Shumail, H., Khan, H., Humayoun, F., Ghaffar, N., ... &Alqahtani, A. M. (2021). Green synthesis and antibiofilm potential of Silver Nanoparticles loaded with Narcissus tazetta L. Extract. Main Group Chemistry, 20(2), 203-218.

[30]. Soleimani, S. H., Bernard, F., Amini, M., & Khavari-nezhad, R. A. (2020). Cadmium accumulation and alkaloid production of Narcissus tazetta plants grown under in vitro condition with cadmium stress. Plant Physiology Reports, 25, 51-57.

[31]. Thabti, I., Albert, Q., Philippot, S., Dupire, F., Westerhuis, B., Fontanay, S., ... &Varbanov, M. (2020). Advances on antiviral activity of Morus spp. plant extracts: human coronavirus and virus-related respiratory tract infections in the spotlight. Molecules, 25(8), 1876.

[32]. El-Attar, A. B., Othman, E. Z., El-Bahbohy, R. M., & Mahmoud, A. W. M. (2023). Efficiency of different potassium sources, and soil bio-fertilizers for growth, productivity, and biochemical constituents of Narcissus (Narcissus tazetta L.). Journal of Plant Nutrition, 46(10), 2416-2433.

[33]. Hajihashemi, S., &Jahantigh, O. (2023). Nitric oxide effect on growth, physiological and biochemical processes, flowering, and postharvest performance of narcissus tazzeta. Journal of Plant Growth Regulation, 42(2), 892-907.

[34]. de Queiroz Souza, A. S., de Sousa, J. A. C., Pinto, C. S., Alves Filho, E. G., Pereira, R. D. C. A., de Brito, E. S., ... & Leal, L. K. A. M. (2021). Untargeted GC/MS-based approach for identification of anti-inflammatory alkaloids from Hippeastrum elegans (Amaryllidaceae) using a human neutrophil model. Journal of Pharmaceutical and Biomedical Analysis, 199, 114061.

[35]. Ben-Abdallah, S., Sefi, M., Soudani, N., Hamdi, A., Bejaoui, S., Issaoui, H., ... &Karray-Bouraoui, N. (2021). Potential antioxidant effects of Narcissus tazetta phenolic compounds against cadmium chloride–induced hepatotoxicity in Swiss albino mice. Environmental Science and Pollution Research, 28, 66193-66205.

[36]. Fernández-Galleguillos, C., Romero-Parra, J., Puerta, A., Padrón, J. M., &Simirgiotis, M. J. (2022). Alkaloid profiling, anti-enzymatic and antiproliferative activity of the endemic Chilean Amaryllidaceae Phycellacyrtanthoides. Metabolites, 12(2), 188.

[37]. Morovvati, H., & Armand, N. (2019). Assessment of Changes in Serum Concentrations of Liver Function (ALT, ALP, AST, LDH, GGT) After the Intake of Narcissus Bulbs. Journal of Fasa University of Medical Sciences/Majallah-iDanishgah-iUlum-iPizishki-iFasa, 9(4).

[38]. Al-Snafi, A. E. (2020). Constituents and pharmacology of Narcissus tazetta. IOSR Journal of Pharmacy, 10(9), 44-53.

[39]. Rezadoost, M. H., Kumleh, H. H., &Ghasempour, A. (2019). Cytotoxicity and apoptosis induction in breast cancer, skin cancer and glioblastoma cells by plant extracts. Molecular Biology Reports, 46, 5131-5142.

[40]. Haq, A., Badshah, L., Ali, A., Ullah, A., Khan, S. M., & Ullah, I. (2022). Ethnobotanical study of medicinal plants of Pashat Valley, Bajaur, along Pakistan–Afghanistan border: a mountainous region

of the Hindu Kush Range. Nordic Journal of Botany, 2022(11), e03580.

[41]. Soleimani, S. H., Bernard, F., Amini, M., & Khavari-nezhad, R. A. (2020). Cadmium accumulation and alkaloid production of Narcissus tazetta plants grown under in vitro condition with cadmium stress. Plant Physiology Reports, 25, 51-57.

[42]. Salem, S. M. M., &Seleem, F. M. (2020). Effect of Cold Storage of Bulbs and Bulb Weight on Growth, Flowering, Essential Oil Components and Bulb Active Ingredients of Narcissus tazetta Plant. Hortscience Journal of Suez Canal University, 9(1), 1-12.

[43]. DEMİR, S., & ÇELİKEL, F. G. (2021). Gibberellin Inhibitor Treatments Before Planting Control Plant Height of Narcissus tazetta by Affecting Growth Parameters. KahramanmaraşSütçü İmam ÜniversitesiTarımveDoğaDergisi, 24(5), 978-985.

[44]. Nimrouzi, M., Jaladat, A. M., &Zarshenas, M. M. (2020). A panoramic view of medicinal plants traditionally applied for impotence and erectile dysfunction in Persian medicine. Journal of Traditional and Complementary Medicine, 10(1), 7-12.

[45]. HachemMajdalani, C. (2021). Applying an Ecosystem Approach to Assess Biosphere Reserve Management: The Case of Jabal Moussa Biosphere Reserve (Doctoral dissertation).

[46]. Puri, S., Sahal, D., & Sharma, U. (2021). A conversation between hyphenated spectroscopic techniques and phytometabolites from medicinal plants. Analytical Science Advances, 2(11-12), 579-593.

[47]. Sohail, M., Rabbi, F., Younas, A., Hussain, A., Yu, B., Li, Y., ... & Xu, H. (2022). Herbal bioactive–based nano drug delivery systems. In Herbal Bioactive-Based Drug Delivery Systems (pp. 169-193). Academic Press.

[48]. Alam, M. Z., & Ahmad Khan, M. S. (2021). Phytomedicine from middle eastern countries: an alternative remedy to modern medicine against Candida spp infection. Evidence-Based Complementary and Alternative Medicine, 2021, 1-15.

[49]. Raj, R., Kumar, S., Chauhan, P. S., & Raj, S. K. (2022). An overview of Potyviruses infecting daffodil and their disease management. Acta Phytopathologica et EntomologicaHungarica, 57(2), 165-188.

[50]. Barani, M., Sangiovanni, E., Angarano, M., Rajizadeh, M. A., Mehrabani, M., Piazza, S., ... &Nematollahi, M. H. (2021). Phytosomes as innovative delivery systems for phytochemicals: A comprehensive review of literature. International Journal of Nanomedicine, 16, 6983.

[51]. Zainuddin, N., Keni, M. F., & Ibrahim, S. A. S. (2019). Effect of biofertiliser containing different percentage rates of chemical fertiliser on oil palm seedlings. Journal of Oil Palm Research, 31(4), 582-591.

[52]. Thuwaini, M. M. (2022). Natural sources as promising future anticancer therapies-A review. GSC Biological and Pharmaceutical Sciences, 19(2), 084-113.