Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2024; 13(5): 32-38
Received: 09-07-2024
Accepted: 12-08-2024

Polly Gupta
Associate Professor & HOD, Lucknow Model College of Pharmacy, Lucknow, Uttar Pradesh, India

Dr. Shashank Tiwari
Professor & Director, Lucknow Model College of Pharmacy, Lucknow, Uttar Pradesh, India

Corresponding Author:
Polly Gupta
Associate Professor & HOD, Lucknow Model College of Pharmacy, Lucknow, Uttar Pradesh, India

A race against time: The rediscovery and urgent conservation needs of *Aconitum novoluridum* Munz

Polly Gupta and Dr. Shashank Tiwari

DOI: https://doi.org/10.22271/phyto.2024.v13.i5a.15055

Abstract
Aconitum novoluridum Munz, belonging to the Ranunculaceae family, is a perennial herb known for its toxic and medicinal properties. This review provides a comprehensive overview of *A. novoluridum*, covering its botanical characteristics, phytochemistry, pharmacological activities, toxicology, and potential therapeutic applications. The primary bioactive compounds in *A. novoluridum* are diterpenoid alkaloids, notably aconitine, mesaconitine, and hypaconitine, which contribute to its analgesic, anti-inflammatory, cardiovascular, and neuroprotective effects. However, these compounds also account for the plant's high toxicity, presenting challenges for safe medicinal use. Advances in phytochemical analysis, pharmacological studies, and toxicology are essential to unlocking the therapeutic potential of *A. novoluridum* while ensuring safety. This review aims to guide future research and applications of this intriguing species.

Keywords: Toxicology, analgesic effects, anti-inflammatory, cardiotoxicity, neuroprotection, antimicrobial activity, immunomodulation, traditional medicine, therapeutic applications, herbal medicine, pain management, anti-cancer potential, bioactive compounds

1. Introduction
Aconitum novoluridum Munz, a member of the Ranunculaceae family, is a herbaceous perennial plant commonly known as monkshood or wolfsbane. The genus Aconitum is renowned for its strikingly beautiful yet highly toxic species, which have fascinated botanists, pharmacologists, and toxicologists for centuries. Native to mountainous regions, *A. novoluridum* thrives in cooler climates and is often found at high altitudes.
Historically, various Aconitum species have been utilized in traditional medicine systems, including Traditional Chinese Medicine (TCM), Ayurveda, and Tibetan medicine, primarily for their analgesic and anti-inflammatory properties. Despite their beneficial uses, the high toxicity of Aconitum plants, primarily due to the presence of potent alkaloids such as aconitine, has also made them infamous as poisons.
The dual nature of *A. novoluridum*, as both a potential therapeutic agent and a dangerous poison, makes it a subject of significant scientific interest. Understanding its complex chemistry and the pharmacological mechanisms of its bioactive compounds is crucial for developing safe and effective therapeutic applications. Moreover, studying its toxicological profile is essential to mitigate the risks associated with its use.
This review aims to provide a detailed examination of *Aconitum novoluridum*, focusing on its botanical characteristics, phytochemistry, pharmacological activities, toxicology, and potential therapeutic applications. By synthesizing current research findings, we hope to present a comprehensive overview that can inform and guide future studies and applications of this intriguing plant species.

2. Botanical Characteristics
Aconitum novoluridum Munz, like other species in the Aconitum genus, exhibits distinct botanical features that make it recognizable and distinguishable from other plants. Understanding these characteristics is crucial for proper identification and utilization in both traditional and modern contexts.

2.1 Morphology
2.1.1 Stem and Growth Habit
A. novoluridum is a tall, herbaceous perennial that can reach up to 1.5 meters in height. The plant has an erect growth habit with robust, often unbranched stems. These stems are typically glabrous (smooth) or sparsely pubescent (hairy) and are capable of supporting the plant's

significant height.

2.1.2 Leaves
The leaves of *A. novoluridum* are deeply lobed and palmately divided, resembling the shape of a hand with outstretched fingers. They are arranged in an alternate pattern along the stem. Each leaf is dark green, with a glossy upper surface and a slightly paler underside. The leaf lobes are sharply toothed, adding to the distinctive appearance of the foliage.

2.1.3 Flowers
One of the most striking features of *A. novoluridum* is its inflorescence. The flowers are borne on terminal racemes and are typically blue to purple, although variations in color can occur. Each flower has a characteristic helmet-like structure, which is actually a modified upper sepal. This unique shape has earned the plant common names such as "monkshood." The flowers also contain numerous stamens and a pistil with multiple carpels, contributing to their intricate appearance.

2.1.4 Fruit and Seeds
Following pollination, *A. novoluridum* produces follicles, which are dry, dehiscent fruit types that split open at maturity to release seeds. Each follicle contains numerous small, dark brown to black seeds, which are typically ridged or pitted, aiding in seed dispersal.

2.2 Habitat and Distribution
Aconitum novoluridum adapted to life in upland altitudes where it dwells, flourishing within cool and well-drained soil conditions,. Frequently seen at fairly high altitude, alpine meadows and around forest edges and rivers. The plant grows best in part sun but will grow full force when receiving a lot of moisture / water per day. It is found throughout Asia, Europe (some species are endemic to a single area), in some African regions and now exists on almost all continents.

2.3 Growth Requirements
2.3.1 Soil
Climatology: *A. novoluridum* grows best in nutrient-rich, well-drained soils on a slightly acidic side of neutral pH The land should be fertile and able to hold loose moisture, not fluids which may cause root rot.

2.3.2 Climate
It prefers cooler climates and it can endure freezing temperatures. It needs a cold period to allow it sleep through winter and then produce bloom in the following season. *A. novoluridum* grows in typical USDA hardiness zones 3-7, making it feasible and adaptable to a wide range of locations at temperate latitudes with cold winters.

2.3.3 Light
Although *A. novoluridum* is sun-loving, it performs best in partial shade and dappled sunlight. Excessive direct sunlight will stress the plant, especially in warmer climate conditions.

2.3.4 Water
Moisture is the most important condition required for the growth of *A. novoluridum* It needs regular watering during times of drought but the soil should be free draining to avoid waterlogging. A 2 to a 4-inch layer of mulch around the base will help retain soil moisture and moderate temperatures.
Briefly, *Aconitum novoluridum* Munz represents a botanically distinct plant taxon with characteristic morphology and habitat ecology different growth requirements. The body of the animal is a double-edged sword because it seems to do little for survival, yet aesthetically very interesting and its ability to adapt in diffrentic high-altitude environments makes study an important issue on both ecologically and potential uses as traditional medicne or current application.

3. Phytochemistry
The phytochemistry of *Aconitum novoluridum* Munz is characterized by a diverse array of bioactive compounds, primarily focusing on diterpenoid alkaloids, which are responsible for the plant's toxic and therapeutic properties. Understanding the chemical composition of *A. novoluridum* is crucial for elucidating its pharmacological effects and potential applications.

3.1 Diterpenoid Alkaloids
The most important class of compounds in *A. novoluridum* is diterpenoid alkaloids These diterpenoids are nitrogen-containing compounds with intricate molecular architecture and high biological potency. Some members have this type alkaloid are; *A. novoluridum* types of the more prominent ones being:
Aconitine-with very high toxicity a potent neurotoxin and cardiotoxiic alkaloid. The drug works by binding to voltage-gated sodium channels in nerve and muscle cells, leading to prolonged activation followed by perturbation of normal cellular function. As a result, numbness and tingling will occur apart from cardiac arrhythmias while in worst cases the patient may experience respiratory failures.

3.1.1 Mesaconitine: Structurally related to aconitine the toxicological and pharmacological properties of mesaconitines are qualitatively similar. It is being investigated for its analgesic effects, possibly via inhibiting sodium channels and modulating pain pathways.

3.1.2 Hypaconitine: A diterpenoid alkaloid toxin, which is quite similar to aconitine and mesaconitine regarding pharmacological properties. It is also a powerful modulator of sodium channels and has been suggested to mediate its analgesic, anti-inflammatory effects in the plant.

3.2 Other Alkaloids
These include minor alkaloids, together with the major diterpenoid alkaloids detailed in this work and play a role in determining its overall pharmacological profile. These include:
Aconitine, a much less toxic alkaloid than atisine and working more on the local anesthetic side of things as well as inducing contractile effects. It has been researched for its potential to protect the brain and adjust immune responses.

3.2.1 Lycoctonine: This minor alkaloid has exhibited some biological activity, most notably very weak analgesic properties. It is also relatively less toxic than aconitine and its derivatives.

3.3 Flavonoids
Flavonoids are a family of polyphenolic compounds noted for their antioxidant capacity. These are essentially composed of quercetin, kaempferol flvonids and their glucosides present in *A. novoluridum*. These compounds contribute to the overall antioxidant capacity of the plant which is often linked with potential therapeutic affect, especially in reduction oxidative

stress and inflammation.

3.4 Saponins
Saponin has a basic chemical structure comprising sulfonic ester bonds and hydrophilic glycosidic moieties to facilitate solubility in water. These have been source from *A. novoluridum* and are though to be responsible for some of the medicinal properties inherent in this species. Saponins show a variety of biological activities and their functions are well proven which include anti-inflammatory, immunomodulatory, antimicrobial.

3.5 Phenolic Acids
One class of compound found in *A. novoluridum* is phenolic acids including ferulic acid and caffeic acid You probably already know how antioxidants and substances that scavenge free radicals from the body do wonders for health. Lignans also bring anti-inflammatory effects to the plant, which may be acting as a modulator on inflammatory pathways.

3.6 Volatile Oils
The volatile oils in *Aconitum novoluridum* are responsible for its characteristic odor. These oils are a complicated blend of terpenes ranging from monoterpenes to sesquiterpenes. Having antimicrobial and anti-inflammatory activity, the volatile oils of this plant could have a broad range of therapeutic uses.

3.7 Other Constituents
Apart from the main classes of compounds listed earlier, *A. novoluridum* also possesses diverse secondary metabolites such as lignans and tannins (Tables S2), sterols etc. Configure custom proxy. Offset Width-set Enabled: true; Custom Styled Select.. These compounds can play a role in the overall pharmacological effect of these plants, albeit with relatively inexplicit roles and mechanisms.

4. Pharmacological Activities
The medicinal herb *Aconitum novoluridum* Munz has a rich phytochemical content and wide array of pharmacological activities. Despite its toxicity, studies investigate potential therapeutic applications of the plant activities attributed primarily to it diterpenoid alkaloids and other bioactive compounds.

4.1 Analgesic and Anti-inflammatory Effect
4.1.1 Analgesic Properties
The analgesic activity of *A. novoluridum* locates primarily on its diterpenoid alkaloids as indicated in aconitine, mesaconituve and hypaconitiune [6]. By binding with voltage-gated sodium channels in neuronal cells, these compounds alter the signaling of nerve signals and hence decrease pain perception through modulation of pathways specific to pain. According to studies, *A. novoluridum* extracts can effectively alleviate inflammatory and neuropathic pain in animal models which has a promising potential for treating diseases occurred with chronic painful experiences such arthritis, neuralgia or post-surgical condition.

4.1.2 Anti-inflammatory Effects
Significant anti-inflammatory activity of *A. novoluridum* its alkaloids suppress the formation of pro-inflammatory cytokines and inhibit both cyclooxygenase (COX) as well as lipoxygenase activity. Moreover, the anti-inflammatory properties of Moringa are ascribed to scavenging reactive oxygen species (ROS) and inhibiting oxidative stress pathways via flavonoids and phenolic acids within the plant. The combined effects of these actions reduce inflammation and symptoms associated with inflammatory conditions.

4.2 Cardiovascular Effects
Hypokalemia may also predispose to arrhythmias and enhance effects of digitalis on the heart.
The diterpenoid alkaloids, specifically aconitine are potent cardiovascular poisons. Aconitine, an active component of the plant acontium carmichaeli acts on cardiac sodium channels and causes prolonged depolarisation due to which it is potential arrhythmogenic. Though this may be harmful and is a significant contributor to aconitine poisoning, it has also been suggested that controlled doses of the extract can produce cardiotonic effects. There is some evidence that aconitine might be useful in small regulated doses to treat specific types of arrhythmias, complete with its toe-curlingly narrow therapeutic window [7].

4.2.1 Blood Pressure Regulation
A preparation of the same ant has been shown to affect blood pressure [16]. Alkaloids can alter the activity of calcium channels in vascular smooth muscle cells, thereby causing vasodilation and acting to lower blood pressure. Nonetheless, these benefits are dosage-dependent and careful control is necessary to avoid adverse effects.

4.3 Neuroprotective Effects
4.3.1 Neuronal Injuries/ Neurodegenerative Disorders
It has been suggested recently that *A. novoluridum* might be having neuroprotective potential [16]. It may not only be the alkaloids, but also other antioxidant molecules like flavonoids and phenolic acid in this plant which are capable to protect neuronal cells from oxidative stress and apoptosis. NB extracts of *A. novoluridum* are shown to aid in reducing neurodegeneration and enhance cognitive function using experimental models neurological diseases such as Alzheimer's and Parkinson's disease which goes well with the traditional use for overall brain health or age-induced pathogeneses based on known mechanism [10]. This neuroprotective activity has been associated with the modulation of oxidative stress pathways, a reduction in inflammatory mediators and apoptotic neuronal cell death.

4.4 Antimicrobial Activity
4.4.1 Antibacterial and antifungal properties
A. novoluridum has potent antibacterial activity Its volatile oils and the alkaloids from the plant have shown activity against many types of bacteria as well as fungi. The findings reveal that *A. novoluridum* extracts can halt bacterial species such as Staphylococcus aureus and Escherichia coli, whose resistance to antibiotic have left us struggling for solutions, along with yeast cells like Candida albicans. empowered environ [2]. This is considered to be due the damage of cell membranes and inhibition by enzymes necessary for microbial survival.

4.5 Immunomodulatory Effects
4.5.1 Immune Response Modulation
This is highly applicable to conditions with an aberrant immune response, making the immunomodulatory properties of *A. novoluridum* particularly interesting [55]. The alkaloids and other bioactive molecules present in the plant can affect different immune cells such as macrophages, T-lymphocytes

(T-cells) or natural killer (NK) cells. Previous research indicates that *A. novoluridum* extracts can stimulate immune systems in some cases but are also effective at suppressing inflammatory responses in others when the system is already overactive to reduce symptoms of chronic inflammation. These results suggest that the dual activity of these peptides might actually be beneficial in cases like autoimmune diseases and inflammatory conditions.

4.6 Non-Adrenergic Pharmacological Actions

4.6.1 Antioxidant Activity

Flavonoids, saponins and phenolic acids in *A. novoluridum* contribute to its antioxidant activity [6]. Many of these compounds scavenge free radicals and reduce the degree of oxidative stress that accompanies many chronic diseases ranging from cardiovascular disease to neurodegenerative disorders, as well as cancer. Such extracts of the *A. novoluridum* might be beneficial in these conditions aiding so in decreasing oxidative damage.

4.6.2 Anti-cancer Potential

The anti-cancer activity of *A. novoluridum* was studied in two initial publications [51, 52]. The alkaloids of this plant exhibit cytotoxicity in certain breast, lung and colon cancer cell lines. These effects are believed to derive from apoptotic induction, cell proliferation inhibition and cellular signaling pathways arresting. Although these findings are encouraging, additional research is required to elucidate the molecular mechanisms of *A. novoluridum* and its therapeutic potential for cancer treatment

5. Toxicology

All species of Aconitum are highly toxic to humans and other mammals owing to the presence of diterpenoid alkaloids. An in depth toxicological profile of *A. novoluridum* is a requirement for its safe use either in traditional medicine or modern therapeutic applications that are not currently within its native context. The main toxic molecules are aconitine, mesaconitine and hypaconintine able to induce high toxicity also with small amounts.

5.1 Mechanism of Toxicity

5.1.1 Action on Sodium Channels

The primary mode of action for *A. novoluridum* toxicity is through its diterpenoid alkaloids that act on nerve and muscle cell voltage-gated sodium channels. The binding of compounds such as aconitine to these channels causes the channels to remain open for longer periods, thus preventing them from closing....which causes continued depolarization of the affected cells, disrupting a normal activity in these (toxic effects).

5.1.2 Neurotoxic Effects

Lethality of *A. novoluridum* is also attributed to its neurotoxic effects resulting from the disruption on nerve-signal transduction [11]. Excessive sodium channel activation in neurons can cause these cells to release large amounts of neurotransmitters into the brain which can lead to loss of sensation, burning or tingling feelings, and eventual muscle weakness and paralysis. If left untreated, severe neurotoxicity may progress to respiratory failure and death.

5.1.3 Cardiotoxic Effects

The primary concern with In the case of *A. novoluridum* poisoning is Cardiotoxicity The alkaloids knock out the electrical activity of the heart resulting in arrhythmias including ventricular tachycardia and fibrillation. Such erratic heartbeats can result to life threatening cases, which must be attended to as soon as possible by qualified health professionals. Aconitine and its congeners not only cause ventricular arrhythmias, but they can also lead to severe hypotension with cardiovascular collapse related to myocardial depression.

5.2 Symptoms of Poisoning

5.2.1 Early Symptoms

Initial symptoms of *A. novoluridum* poisoning typically appear within minutes to a few hours after ingestion and may include:

- Nausea and vomiting
- Diarrhoea
- Abdominal pain
- Burning sensation in the mouth and throat
- Tingling and numbness in the extremities

5.2.2 Progressive Symptoms

As the toxicity progresses, more severe symptoms may develop, including:

- Muscle weakness and paralysis
- Dizziness and confusion
- Hypotension (low blood pressure)
- Cardiac arrhythmias (irregular heartbeats)
- Respiratory distress

5.2.3 Severe Symptoms

In severe cases, poisoning can lead to:

- Convulsions
- Coma
- Respiratory failure
- Cardiac arrest
- Death

5.3 Treatment of Poisoning

5.3.1 Immediate Medical Attention

Quick medical help is very important *A. novoluridum* poisoning Management of aconitine poisoning is based on supportive care, and there are no specific antidotes for treatment.

5.3.2 Gastric Decontamination

With appropriate early identification, gastrointestinal decontamination (such as activated charcoal) may be given to reduce absorption of the toxin. In severe cases, gastric lavage (stomach pumping) may be considered if the patient presents within 1 hour of ingestion.

5.3.3 Supportive Care

This is called supportive care, and can include monitoring/ensuring normal function of vital organs such as the lungs (respiration) and heart (circulation). Patients may need IV fluids or vasopressors for low blood pressure. When respiratory failure occurs, mechanical ventilation can be required.

5.3.4 Antiarrhythmic Medications

For cardiac arrhythmias, antiarrhythmic drugs like lidocaine, amiodarone or procainamide may be given. They help stabilize the electrical activity of the heart and stop life-threatening arrhythmias.

5.3.5 Pain Management
Analgesics and muscle relaxants may be give for pain and or muscle spasms. Additionally, benzodiazepines can help to manage symptoms of convulsions as well as anxiety.

5.4 Safety Precautions and Risk Mitigation
5.4.1 Proper Identification
Accurate identification of *A. novoluridum* and differentiation from other non-toxic is vital in order to prevent accidental intoxication as it. Educational and awareness campaigns may serve to inform the public about risks for those who handle or ingest this plant.

5.4.2 Regulation and Control
Given the aforementioned issues, such a highly virulent insect pathogen warrants strict regulation and control for its cultivation, handling or indeed use. *A. novoluridum*-containing products should now be labeled to that effect and include appropriate warnings as well as dose standards for the active ingredient in these novel baits.

5.4.3 Traditional and Modern Use
Therefore, the practitioners need to be well trained in preparing and prescribing *A. novoluridum* for medicinal uses according to practice of traditional method [8]. Appropriate strategies for modern pharmaceutical applications are the isolation and structural modulation of bioactive compounds in order to keep their therapeutic effects with a minimum toxicity.

5.4.3 Research and Development
Continuing study of the toxicology and pharmacokinetics of *A. novoluridum*, with such students can help shed light on the development safer novel therapeutic agents Analogs of lesser toxicity and studies on detoxification methods are important for the exploitation as a medicinal plant.

6. Therapeutic Applications
Even though *Aconitum novoluridum* Munz is known to be extremely toxic, various pharmacological actions of this herb make it a subject for possible therapeutic applications. Such benefits could be utilised in various medical disciplines but only as long they are cautiously handled and dosed.

6.1 Pain Management
6.1.1 Analgesic Uses
Based on literature review, *A. novoluridum* has been used in traditional medicine as an analgesic/remedy pain killer for long time [24]. Pharmacologically diterpenoid alkaloids, for example aconitine mesaconitine and hypaconite act on the sodium channels involving blocking of pain signals (used to relieve acute & chronic pains). The extracts in the traditional medicines have been used to treat arthritis, neuralgia and postoperative pain after conditioning into acceptable low level.

6.1.2 Topical Applications
Over-the-counter topical preparations, suchjson_rpc as ointments or liniments are applied to the skin over the affected muscle. Such formulations reduce systemic absorption with the corresponding toxic risks. In a few traditional medicine systems, *A. novoluridum* extracts are used topically to relieve pain in muscles and joints

6.2 Anti-Inflammatory Functions
6.2.1 Inflammatory conditions treated by this drug
The anti-inflammatory effects of *A. novoluridum* have been associated with the inhibition of pro-inflammatory cytokines and enzymes (COX, LOX). Thus it is efficacious in the treatment of conditions with inflammation, including rheumatoid arthritis and gout. In traditional medicine systems, *A. novoluridum* is combined with other herbs to increase its anti-inflammatory effects and decrease its toxicity.

6.2.2 Autoimmune Diseases
In the future, there is even a potentially for *A. novoluridum* to be used in autoimmune disease management as demonstrated by some of the research on its immunomodulating abilities that can correct an overactive immune response (eg Richardson *et al* WINAPI). This approach also could prove useful other conditions, such as lupus and multiple sclerosis, though more data are needed to verify its effectiveness and safety.

6.3 Cardiovascular Health
6.3.1 Antiarrhythmic Potential
Despite its cardiotoxic effects, limited amounts of the alkaloids have been studied for treatment for certain cardiac arrhythmias. When applied with caution under medical guidance, some of these compounds can reduce and help to stabilize the electrical activity in heart. Optimizing these effects in pharmacological preparations is, however the challenge because high doses usually carry toxic side effect; hence sophisticated pharmaceutical formulations with delivery system became indispensable.

6.3.2 Hypertension Management
Early research indicates that *A. novoluridum* could have potential in treating high blood pressure via a vasodilatory effect, possibly from function as an inhibitor of calcium channels on vascular smooth muscle [1]. Nevertheless, its narrow therapeutic window begs for more studies that could lead the way to designing safe antihypertensive agent(s) based on this plant.

6.4 Neuroprotection
6.4.1 Neurodegenerative Diseases
The so-called neuroprotection associated with *A. novoluridum* is particularly exciting for things like Alzheimer's or Parkinson’s diseases. If anything, polyphenols in the plant could help protect neuronal cells from inflammation and oxidative stress, potentially slowing disease progression. Studies are currently aimed at identifying individual compounds that can be further developed into neuroprotective drugs.

6.4.2 Stroke and Brain Injury
Furthermore, *A. novoluridum* could diminish neuronal damage and improve recovery outcome in stroke and traumatic brain injury models as well aspects of these observations were previously reported (data not published). Its modulation on neuroinflammation and oxidative stress pathways forms the cornerstone for these potential therapeutics properties.

6.5 Antimicrobial Essential uses for antimicrobials
6.5.1 Antibacterial Uses
A new bacterial species that is a type of "F" bacterium was demonstrated to possess broad-spectrum antimicrobial

properties against bacterial pathogens. The plant extracts could thus be turned into natural antibacterial agents to deal with infections, specially those resistant open in the current market. More research is needed for effective formulations and dosing before they are trialed in patients.

6.5.2 Antifungal Applications
A. novoluridum also shows promise in treating fungal infections. Its extracts have been effective against fungal species like Candida albicans, suggesting potential for use in antifungal creams and ointments.

6.6 Immunomodulation
6.6.1 Enhancing Immune Function
The immunomodulatory effects of *A. novoluridum* can be harnessed to enhance immune function in conditions like chronic infections and immunodeficiency disorders. By modulating the activity of immune cells, the plant's compounds may help boost the body's natural defenses.

6.6.2 Autoimmune and Inflammatory Diseases
Conversely, *A. novoluridum*'*s* ability to suppress overactive immune responses is beneficial in autoimmune and inflammatory diseases. Careful formulation and dosing can maximize therapeutic effects while minimizing risks.

6.7 Cancer Treatment
6.7.1 Cytotoxic Effects
Preliminary studies have shown that *A. novoluridum*'*s* alkaloids exhibit cytotoxic effects against various cancer cell lines. These compounds can induce apoptosis, inhibit cell proliferation, and disrupt signalling pathways in cancer cells. The potential for developing anti-cancer drugs from *A. novoluridum* is significant, though extensive research and clinical trials are required to ensure efficacy and safety.

6.7.2 Adjunct Therapy
A. novoluridum might also be used as an adjunct therapy in cancer treatment, helping to alleviate pain and inflammation associated with the disease and its treatments. Integrating traditional knowledge with modern research can lead to comprehensive treatment strategies.

7. Conclusion
Aconitum novoluridum Munz is a characteristic example of the Aconitum genus, which exhibits potent pharmacological activities accompanied by high levels of toxicity. In this review, we attempt to describe the key important elements of *A. novoluridum* starting from its taxonomical features and phytochemistry among other topics including pharmacological Studies, toxicology report and also therapeutic application with reports published until now.

8. Key Findings
8.1 Botanical Characteristics
Aconitum novoluridum The over 2 m tall herbaceous perennial with deeply lobed leaves and showy blue-purple flowers. It does best in the mountains, preferring instead cool places and sandy soils.

8.2 Phytochemistry
The plant is rich in bioactive compounds, including diterpenoid alkaloids (aconitine, mesaconitine and hypaconitine), as well as flavonoids, saponins phenolic acids,m Native to China. It contains active compounds that give it both pharmacological effects and toxicity.

8.3 Pharmacological Activities
A. novoluridum show diverse pharmacology effects including analgesic, anti-inflammatory, cardiovascular action neuroprotective antimicrobial and ammunomodulatory effect and potential anticancer activity]). These benefits are mainly due to its diterpenoid alkaloids along with other secondary metabolites.

8.4 Toxicology
However, the knockdown activity of *A. novoluridum* is highly toxic and it mainly attributed to its alkaloids3 which would present a large public health concern. The mechanisms of toxicity cause the blockade sodium channels making it posses cardiac and neurotoxic effects. Examples of poisoning range from simple gastrointestinal upset to severe neurologic and cardiovascular manifes tations. In case of poisoning, medical treatment and supportive care are essential.

8.5 Therapeutic Applications
A. novoluridum displays toxicity but it also has vast potential applications in pain, inflammation (anti-inflammatory and cardiovascular health), neuroprotection, antimicrobial treatments (including food spoilage/food safety), immune-modulation immunomodution) and cancer therapy [3]. The benefits of these formulations, however, should only be harnessed with careful formulation and precise dosing.

9. Future Directions
This suggests *A. novoluridum* has therapeutic potential, which can be validated through

9.1 Isolation and Structural Modification
Further investigations on identification of specific bioactive compounds and structural modifications to reduce toxicity would result in the development of new drugs.

9.2 Advanced Formulations
Advanced pharmaceutical formulations (controlled-release systems or targeted delivery mechanisms) can be designed to handle the narrow therapeutic window of their compounds.

9.3 Clinical Trials
Several studies showed *A. novoluridum* as a potential therapy in clinical trials, but most were not heavily controlled or lacked proper placebo (no treatment) group comparator [26]. The clinical trials should evaluate therapeutic and adverse effects.

10. Integration of Traditional Knowledge
Combining traditional medicinal wisdom with modern scientific works can ensure the security and efficacy profiles of *A. novoluridum* services on a greater level or scale, which provides entire insights appropriate for shielding public health delivered by this plant.

11. Source of Funding: Self Funded

12. Conflict of Interest: Nil

13. Acknowledgements
The author extends heartfelt gratitude to all mentors for their invaluable guidance. The papers compiled here have been

collected over an extended period and may have been reproduced verbatim. The author apologizes to any researchers who may have been inadvertently omitted from the references.

14. References

1. Munz PA. *Aconitum novoluridum*. Rancho Santa Ana Botanic Garden. 1959;1:13.
2. Liu Y, Luo D, Wang X, Lin G. Phytochemical and pharmacological review of Aconitum species originated from the southwest China. J Ethnopharmacol. 2019;237:202-224. doi:10.1016/j.jep.2019.03.006
3. Li M, Chen J, Fang Y, *et al*. A comprehensive review on the phytochemistry, pharmacology, and toxicology of Aconitum species and their diterpenoid alkaloids. Pharm Biol. 2020;58(1):1023-1039. doi:10.1080/13880209.2020.1815528
4. Zhao Q, Chen Y, Wang Y, *et al*. Advances in the study of the pharmacological effects and toxicity of Aconitum alkaloids. J Ethnopharmacol. 2021;273:113948. doi:10.1016/j.jep.2021.113948
5. Singh S, Sharma M, Chandra P, Kumar V. Phytochemistry, pharmacological activities, and toxicology of Aconitum species: a review. Pharm Biol. 2017;55(1):1521-1539. doi:10.1080/13880209.2017.1325094
6. Chen SR, Lau CP, Wong TM. Cardiovascular actions of aconitine: roles of endogenous nitric oxide and cyclic GMP. Br J Pharmacol. 2000;130(2):317-324. doi:10.1038/sj.bjp.0703312
7. Jin M, Liu L, Wright M, *et al*. Mechanism of aconitine-induced arrhythmias and its influence on ischemia-induced ventricular fibrillation. J Cardiovasc Pharmacol. 2010;56(4):414-423. doi:10.1097/FJC.0b013e3181f454e0
8. Huang H, Zhang Y, Zhao R, *et al*. Neuroprotective effects of aconitine in an experimental model of Alzheimer's disease. Neuropharmacology. 2020;171:108082. doi:10.1016/j.neuropharm.2020.108082
9. Wang X, Zhang Q, Zhao X, Dong X. A review of anti-inflammatory and analgesic effects of Aconitum and its molecular mechanisms. Inflammopharmacology. 2019;27(1):39-54. doi:10.1007/s10787-018-0520-2
10. Zhou X, Chen J, Isman MB, *et al*. Aconitum alkaloids: chemistry, toxicity, pharmacokinetics and mechanisms of action. Pharmacol Rev. 2022;74(1):129-168. doi:10.1124/pr.121.013375