Chapter 24

Elucidating the Anthelmintic Efficacy and Phytochemical Profile of *Citrullus colocynthis* (Linnaeus) Schrader

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ABSTRACT

Citrullus colocynthis is beneficially being used as a medicinal plant for the management of animal parasites. This botanical entity is commonly referred to as bitter apple or colocynth, it belongs to the Cucurbitaceae plant family and has a historical record of being used for several centuries for the management of various ailments. This study highlights the phytochemical components present in the plant and particularly focuses on the terpenoids, flavonoids, alkaloids, and cucurbitacins as the major bioactive compounds having medicinal properties. Keeping in view the emerging concern of the development of drug resistance to traditional anthelmintic medications, this chapter examines the potential of *C. colocynthis* as a supplementary natural intervention for the management of parasitic infections. The chapter examines the challenges and potential future opportunities pertaining to the utilization of a certain substance as an anthelmintic. The authors advocate for additional research efforts to comprehensively exploit its therapeutic efficacy. Drawing on both traditional knowledge and scientific evidence, it is determined in the article that *C. colocynthis* possesses the capability to impede worm muscle activity and hinder the hatching of eggs, thereby establishing its efficacy as a natural remedy for parasitic worms.

KEYWORDS
Citrullus colocynthis; Parasite control; Traditional uses; Herbal remedies; Ethnomedicine

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INTRODUCTION

Agricultural sustainability in rural areas is largely dependent on livestock production, particularly when the financial returns from crop production are inadequate (Khajuria et al., 2013; Ahmed et al., 2020). However, parasitism has historically posed significant challenges in maximizing the yield generated by livestock production systems (Batool et al., 2019). *Haemonchus* is a primary barrier to small ruminant production and causes an estimated ten billion dollar loss to veterinary production (Roeber et al., 2013). Each parasite consumes about 0.05 mL of blood daily (Alim et al., 2016), resulting in severe damage to the gastrointestinal mucosa (Singh et al., 2015). Continuous blood loss resulting from *H. contortus* produces anorexia, anemia, diarrhea, edema, emaciation, and hypoproteinemia, eventually leading to the animal's death (Githigia et al., 2001). Severe illness significantly impacts meat, milk, and wool production, reduces weight gain by 23-63%, and leads to death in 25% of cases before weaning (Singh et al., 2015). The economy of rural communities heavily relies on domestic ruminants such as cows, buffaloes, goats, and sheep. Amphistome parasites are highly prevalent among domestic ruminants worldwide (Khan et al., 2023). These parasites cause severe and acute fluke infections, resulting in debilitation, reduced productivity, slow growth, and poor production of milk, meat, skin, and wool. Consequently, the livestock industry suffers significant economic losses every year (Menaria et al., 2020). The use of synthetic chemicals to combat nematode pests has been widely and commonly applied; however, these chemicals pose negative environmental and biodiversity impacts increasing the urgency for developing a biosafe alternative. Researchers have studied phytopesticides as an alternative to synthetic chemicals due to their eco-friendly nature, easy availability, and biodegradability in soil. This review article emphasizes the significance of *Citrullus colocynthis* L. Schrad

as a potential biological and pesticidal agent. It can be utilized for treating medicinal ailments and controlling pests that negatively impact animal growth. The article also highlights the importance of harnessing the beneficial properties of this plant against nematodes (Khatri et al., 2021). The *Cucurbitaceae* family is renowned for its remarkable genetic diversity among food plants (Zaini et al., 2011). These plants are usually drought-tolerant but sensitive to wet, poorly drained soils and frost. Prominent members of this family include bitter apple, bitter gourd, cucumber, pumpkin and melon (Bisognin, 2002). *C. colocynthis* a perennial herb with trailing characteristics, is commonly found in the wild in sandy regions of the Punjab, Sind, North West, southern and central India, the Coromandel coast, Arabia, Tropical Africa, West Asia and the Mediterranean region (Hussain et al., 2014). *C. colocynthis* also known as bitter cucumber, bitter apple, Indravaruni or Gavakshi, is a viny plant native to the Asia and Mediterranean basin, particularly Nubia, Turkey, the desert areas of Pakistan and India. Its fruit extracts have shown antibacterial and antimicrobial effects against *Pseudomonas* and *Staphylococcus*. The application of medicinal plants to prevent and treat gastrointestinal parasitism originated from ethnoveterinary medicine. Medicinal plant-based remedies serve as alternatives to synthetic antihelmintic or anthelminthic drugs.

Botanical Description

C. *colocynthis* is a long-lasting plant with persistent roots and sturdy, rough, vine-like stems that spread horizontally on the ground and can also ascend upwards. It produces a singular yellow blossom at the intersection of takes off. The plant is monoecious, with long stalks and a tuberous rootstock that grows long trailing or climbing stems (Li et al., 2022). The roots are lasting, whereas the stems are precise, intense, and harsh vine-like structures that spread on a level plane on the ground and can too climb upwards. The seeds are smooth in surface, oval in shape, and extend in color from yellow to brown.

A single yellow bloom is created at the intersection of clears out. The plant is monoecious and has long stalks. The takes off are precise and degree roughly 5–10 cm in length. They have a triangular shape, unpleasant surface, and are green in color. The plant produces 15-30 natural products, which are almost 7–10 cm in breadth. The color of the natural product may vary from yellow or green with yellow stripes. The natural product mash contains oval seeds (Hussain et al., 2014).

They are rough on both sides and have 5-7 lobes. *C. colocynthis* produces both male and female flowers. The fruit is globular, slightly flattened, with a diameter of 5-7cm. When ripe, the fruit turns white and smooth, but initially, it is green in color. The fruit contains a dry spongy pulp that is extremely bitter. The seeds are pale brown and measure 4-6mm in length (Pravin et al., 2013).

Geographically Distribution of *Citrullus colocynthis*

Geographically, *C. colocynthis* is found in West Pakistan, barren areas of India, Arabia and Ceylon, primarily in the region west of the Mediterranean (Jafri, 1966). Among the reported 17 genera and 32 species, Pakistan records 25 medicinal plants of the *Citrullus* genus (Jafri, 1966; Nazimuddin and Naqvi, 1984).

Table 1: Taxonomic account of *Citrullus colocynthis* (Linnaeus) Schrader

Sr.No	Classification	
1	Kingdom	Plantae
2	Division	Magnoliphtya
3	Class	Magnolipsida
4	Order	Cucurbitales
5	Family	Cucurbitaceae
6	Genus	*Citrullus*
7	Species	*colocynthis*
References	(Khatri et al., 2021)	

Plant Part Value and Mode of Administration

According to research conducted by Mazher et al., 2023 the fruit of the *C. colocynthis* plant, including its rind, pulp, and seeds, is commonly used by local people for ethnomedicinal and ethnoveterinary purposes. For whole fruit and seeds the highest plant part value (PPV) was found to be 90. Second and third highest PPVs were of rind and pulp as 83.3 and 80, respectively. Lower PPVs of 26.7, 20, and 6.7 was found for leaves, stem and roots respectively. According to the ethnobotanical survery findings the Traditional Ethnomedicines use various methods for preparation of *C. colocynthis*, including cooking the fruits, consuming it as a powder with water, applying it as a paste or poultice, ingesting different parts, making decoctions with water, or making it into tea.

Traditional uses of *Citrullus colocynthis*

Plants have been utilized for therapeutic purposes since antiquated times, and there's presently a developing interest in plant-based medicines resulting from a stronger understanding of the side effects of synthetic drugs. This expanded

request for restorative plants has put weight on species like *C. colocynthis*. This specie is broadly utilized around globally for the treatment of different maladies, counting obstruction, asthma, diabetes, joint torment, bronchitis, jaundice, mastitis and cancer (Abo et al., 2008; Sultan et al., 2010; Pravin et al., 2013).

Table 2: Names of *Citrullus colocynthis* in different Languages

Sr. No	Languages	Common names of plant
1	English	Colocynth, Bitter- gourd, Bitter- apple, Bitter- cucumber
2	German	Koloquinthe
3	French	Coloquinte
4	Sanskrit	Indravaruni
5	Arabic	Handhal
6	Punjabi	Ghurunba or Kortuma
7	Bengali	Makhal
8	Tamil	PaedikariAttutummatt-i
9	Marathi	Kaduindravani
10	Gujarati	Indrayan
11	Malyalam	Paikummatti
12	Hindi	Indrayan
13	Pashto	Maraghonae
References	(De Smet, 1997; Pravin et al., 2013; Elltayeib et al., 2020)	

In subtropical and tropical nations, it is commonly utilized as an antidiabetic medicine. In Pakistan and India, the natural products are utilized to treat intestinal clutters, bacterial diseases, diabetes, and cancer in both people and animals. Different parts of *C. colocynthis* have been utilized for different illnesses. For illustration, the dried natural product mash is successful in treating acid reflux and gastroenteritis, whereas the natural product itself has antioxidant, antimicrobial, and anti-inflammatory properties (Marzouk et al., 2010; Hameed et al., 2020).

Moreover, *C. colocynthis* has appeared potential in treating diabetes, anthelmintic contaminations, torment, sensitivities, and cancer. *C. colocynthis* is also effective in treating gastrointestinal conditions, pulmonary and skin infections, constipation, diabetes and edema. The dried mash of the natural product is utilized for gastrointestinal disarranges, whereas the plant entirely is utilized for diabetes, liver issues, bowel developments, and intestinal issues. Besides, the natural product extricate is utilized for pain relieving. The natural product of *C. colocynthis* has blood filtering properties and can be utilized as a cure for extension of the spleen and tumors. Furthermore, the seeds of this plant are used to manage diabetes, and the leaves are utilized to treat jaundice and asthma (Baquar and Tasnif, 1967; Qureshi et al., 2010).

Fig. 1: Unraveling the Anthelmintic Potential of *Citrullus Colocynthis*

Proximate Composition of *Citrullus colocynthis*

The composition of the seeds and natural products of *C. colocynthis* shifts depends on the nation of beginning. The proximate investigation of *C. colocynthis* uncovered 56.1% fat, 24.7% protein, 10.8% carbohydrate, 3.8% dampness, 3.5% fiery remains and 1.1% fiber. The seed parts contain around 50% oil, 30% protein, 10% carbohydrate, 4% fiery debris, and 3% fiber. It is imperative to note that these values may change due to the wide range of agro-ecological conditions and rural hones in each nation (Ogundele et al., 2012).

Phytochemistry of *Citrullus colocynthis*

C. colocynthis contains a wide extend of bioactive compounds, counting little hydrocarbons, flavonoids, terpenoids, amino acids, hydrocarbons, alcohols, esters, greasy acids, and cucurbitacins. Phytochemical screening of the natural products has uncovered the nearness of glycosides, flavonoids, alkaloids, phenols, carbohydrates, greasy acids, and basic oils (Dhakad et al., 2017).

Glycosides, Phenolic Acids and Flavonoids of *Citrullus colocynthis*

The antioxidant action and phenolic profile of distinctive extricates from *C. colocynthis* have been considered and detailed the locally developed natural products of *C. colocynthis*, two cucurbitacin glucosides (glucopyranosyl cucurbitacin and 2-glucopyranosyl-cucurbitacin L) and three flavone glucosides (isoorientin, isosaponarin and isovitexin) were extricated and distinguished. These flavonoids have critical antioxidant impacts, which are advantageous for treating different disarranges related with receptive oxygen species, such as aggravation, cancer, tissue harm, and other maladies. Within the ethanol extricate of *C. colocynthis* natural products, four flavonoids (quercetin, kaempferol, catechin and myricetin) eight phenolic acids (vanillic corrosive, ferulic corrosive, gallic corrosive, sinapic corrosive, chlorogenic corrosive, p-hydroxy-benzoic corrosive, caffeic corrosive, and p-coumaric corrosive) were recognized (Hussain et al., 2014).

Table 3: Pharmacological activities of *Citrullus colocynthis* and its medicinal use safety and efficacy

Sr. No	Pharmacological Activity	
1	Anti-inflammatory Activity	Potential to reduce inflammation
2	Antioxidant Properties	Exhibits antioxidant effects, Helping to neutralize free radicals
3	Antidiabetic Effects	Potential blood sugar regulation
4	Antimicrobial Activity	Antimicrobial effects against certain bacteria and fungi
5	Gastrointestinal Effects	Laxative properties, possibly linked to compounds stimulating bowel movements

Cucurbitacins of *Citrullus colocynthis*

Various preparations of *C. colocynthis* contain proteins, amino acids, carbohydrates, phenolic compounds, tannins, steroids, alkaloids, terpenoids, glycosides and cucurbitacins A, B, C, D, E, J, and L. From the natural material of *C. colocynthis*, colocynthosides A, cucurbitacin L, and cucurbitacin B were extracted and purified. The most abundant cucurbitane-type triterpene glycoside, Cucurbitacin E 2-O-D-glucopyranoside, and its aglycon, cucurbitacin E, displayed anti-allergic properties (Yoshikawa et al., 2007).

Fatty Acids

The seed oil of *C. colocynthis* contains two major immersed greasy acids (SFAs), palmitic corrosive and stearic corrosive, inside the extend of 8%-17% and 6%-10%, individually. Oleic corrosive and linoleic corrosive are the major monounsaturated greasy acids (MUFAs) show within the oil. Linoleic acid is found within the extent of 50%-60%, which is higher than other oils. *C. colocynthis* seeds contain linolenic, myristic, palmitic, oleic and stearic acid. A few greasy acids found in *C. colocynthis* have been studied for their nematicidal exercises. Oleic corrosive, the foremost common greasy corrosive in nature, has appeared to be showing beneficial action against *Bursaphelenchus lignicolus*. Hexadecanoic, lauric, caprylic, and myristic corrosive have been found successful against the phytonematode *Meloidogyne incognita* (Zhang et al., 2012).

Alkaloids

A few things about it have detailed the nearness of alkaloids, particularly choline and unidentified alkaloids, in *C. colocynthis* natural product, which require assist examination (Ali et al., 2013).

Minerals

The natural product and seeds of *C. colocynthis* contain a wealthy sum of minerals. Specifically, the seeds are a potential source of calcium, potassium, zinc, and phosphorus. The concentration of calcium is 569mg per 100g, whereas potassium is displayed at a concentration of 465mg per 100g (Sadou et al., 2007).

In Vitro Anthelmintic Effect of *Citrullus colocynthis*

Different innate plants have been found to have an anthelmintic impact against cestodes, trematodes, and nematode parasites. A particular plant, *C. colocynthis*, is considered to show antileishmanial and antitumor properties. It is also effective against *Leishmania major* (a protozoan parasite) and show molluscicidal properties against *Biomphalaria Arabica*

(Nizam et al., 2013; Zaid et al., 2013). Additionally, *C. colocynthis* has shown beneficial anthelmintic efficacy against *Haemonchus contortus*, which results in a reduction in the egg count, and also cause the paralysis of the worm *Pheretima posthuman* (Talole et al., 2013; Ullah et al., 2013).

In vitro Assessment of the Anthelmintic Properties of *Citrullus colocynthis* (L.) Schrad on *Haemonchus contortus*.

Haemonchus contortus which is the causative agent of haemonchosis, is a major obstacle in small ruminant production. It causes significant economic losses in the veterinary market, estimated at around ten billion dollars annually. This parasite feeds on approximately 0.5mL of blood per day, resulting in damage to the gastrointestinal mucosa. The continuous blood loss leads to diarrhea, anemia, edema, anorexia, emaciation and hypoproteinemia, eventually causing the animal's death. Severe infections have a substantial impact on wool, meat and milk production, Resulting in a 23-63% drop in weight gain and causing death in 25% of cases prior to weaning. Therefore, there is an urgent need to control infections caused by *H. contortus* in ruminants (Rehman et al., 2021). The same procedure was repeated for the ethyl acetate extract. The extracts were stored as pastes at 4°C. Flavonoids and phenolic compounds in the aqueous methanolic extract were identified through high-performance liquid chromatography (HPLC) analysis. At regular intervals, the worms' motility was examined with an inverted microscope. Worms that did not show any motility were considered alive only if their motility revived after being placed in lukewarm PBS. Egg hatch assays were performed to assess the efficacy of the extracts. Female worms were triturated to release the eggs, which were then diluted to a concentration of 200 eggs per milliliter. The assays included four doses of each extract and three concentrations of oxfendazole (a synthetic drug). Post-incubation, unhatched eggs were counted using an inverted microscope, and their percentage was calculated. The results showed that at a dose rate of 25mg/mL after 4 and 8 hours of exposure of ethyl acetate and aqueous methanolic extracts respectively, paralyzed all adult worms. 83.7% and 80.7% of *H. contortus* eggs remained unhatched in the egg hatch assay, when the same dose of ethyl acetate and aqueous methanolic extracts was used, respectively. These findings suggested that *C. colocynthis* fruit extracts have a promising potential as an alternative to synthetic drugs for controlling *H. contortus* infections.

Orthocoelium scoliocoelium

Swarnakar and Kumawat, 2014 conducted a study and investigated the effects of *C. colocynthis* fruit extracts on amphistome parasites, putting their main focus on *Orthocoelium scoliocoelium*. Although previous research had tested the alcoholic fruit pulp extract of *C. colocynthis* in vitro against these parasites but no studies had examined the anthelmintic effects of the fruit extracts by using a light microscope. In their materials and methods section, Menaria et al., 2020 described the collection of live amphistome parasites from freshly slaughtered domestic ruminants' rumen (buffaloes, sheep, and goats) at the local zoo abattoir in Udaipur. The parasites were thoroughly washed with a saline solution (0.9% NaCl) and then divided into three groups. Following the method of Dutt, 1980, whole mount preparation was carried out to identify the species of amphistomes for the first group. The second group was referred as the untreated control and the the third group was treated in vitro with fruit extracts of *C. colocynthis*. Bouin's fixative was used for fixation of both the control and treated amphistomes for histological examination by using a light microscope. For preparation of the fruit extracts, fresh *C. colocynthis* fruits were recieved from the desert areas of Shriganganagar, Jaisalmer, and Barmer in Rajasthan. The fruit pulp was then dried after separating the seeds and was ground to a powder by using a grinder. The results of the study evaluated that the *C. colocynthis* fruit extract had significant anthelmintic effects on *Orthocoelium scoliocoelium*. Under the light microscope he treated amphistomes showed extensive damage to their structures as compared to the untreated control group. This included disruption of the tegument and internal tissues, indicating the potential of *C. colocynthis* as an effective treatment against intestinal worm infections in ruminants.

Plants used for Treating Intestinal Worms

This ponder centers on the utilization of plants in Ibadan, Nigeria for treating intestinal worms (Afolayan et al., 2022). One of the plants commonly utilized is *C. colocynthis* (L. Schrad. frequently combined with other plants such as *Curculigo Pilosa*, *Securidiata longepedunculata*, *Laganaria breviflorus* and *Anthocleista djalonensis* A. Chev. *C. colocynthis* (L. Schrad) seeds are utilized in treatment by washed and bubbled for 30 minutes together with diced *Laganaria breviflorus*. Alternatively, the roots of *Anthocleista djalonensis* A. Chev., *Securidiata longepedunculata*, the seeds of *C. colocynthis* (L. Schrad) and the bark of *Curculigo pilosa* are thoroughly rinsed and cooked. To address intestinal worm infections, adults are advised to take this treatment once daily, prepared as a decoction. Intestinal worm infections are a significant global health issue, especially in subtropical and tropical regions. Traditionally, three classes of anthelmintics, namely cholinergic agonists, macrocyclic lactones and benzimidazoles have been used to control these worms. However, the emergence of anthelmintic resistance calls for new approaches. One potential avenue that offers natural and cost-effective remedies for parasitic infections (including those caused by intestinal parasites), is the use of medicinal plants and traditional medicine. This research recorded the medicinal herbs utilizatoin in treating intestinal worm infections within the Ibadan metropolis, using an ethnobotanical survey. The main focus of the survey are the three main traditional herb markets in Ibadan: Oba, Oja and Oje, and Iwo Road. Structured questionnaires interviewed

herb sellers and got information regarding the demographic details, names of the plants used, the components of plants, dosage, and the methods of preparation. Data collected was analyzed by descriptive statistics and calculations were made for Relative Frequency Citation (RFC), Use Value (UV), and Informant Consensus Factor (ICF) for the cited plants. The survey put forth that 45 plants from 31 families were used for treating intestinal worms in Ibadan. *Cryptolepis sanguinoleta* (Lindl.) Schltr and *Aristolochia albida* Duch were the most frequently reported, each with an RFC of 0.9. Plants from the Apocynaceae and Euphorbiaceae families were commonly used. The leaves (18.5%) and roots (25%) were the most commonly utilized plant parts.

Ethnoveterinary Practices in Cholistan Desert, Pakistan

An analysis was conducted to record the conventional ethnoveterinary restorative hones utilized by nearby shepherds within the treatment of parasitic illnesses in animals. The analysts conducted a starting study to distinguish conventional healers and collected data through organized surveys and interviews. They found that the parasitic illnesses detailed in animals included lice and tick invasion, helminthiasis, myiasis, and mange. A total of 77 ethnoveterinary remedies were documented, with 49 derived from plant usage and 28 from dairy products, chemicals, and other organic substances. Eighteen plant species belonging to 14 families were identified among the reported remedies for treating parasitic diseases. For case, *C. colocynthis* (Linn.) Schrader was utilized for lice invasion by bubbling 500g of its natural product with 1L of water and applying it topically. For helminthes treatment a mixture of 500g of *C. colocynthis* fruit with 250g each of black and common salt was given orally at a dose of 50-100g per day for 2-3 days. The recorded remedies were used for various domesticated animals in this area, including cattle, goats, sheep, and camels. Different doses were used for small and large animals. It was found that the majority of the remedies were plant-based. Out of the 118 plant species native to the Cholistan desert, only 10 (8%) were used for treating parasitic diseases in animals. However, a total of 64 plant species including herbs, shrubs, grasses and trees have also been reported for their uses as medicine in the desert. Some of the indigenous plants found in the sand dunes and sandy soils of Cholistan desert were *Aizoon carariense, Aerva javanica, Capparis decidua, Cyperus rotundus, Haloxylon salicornicum, Calligonum polygonoides, Pinus roxburghii, C. colocynthis, Salsola baryosma, and Solanum surratens* (Farooq et al., 2008)

Ethnoveterinary Practices for Mastitis

Mastitis could be a exorbitant illness within the dairy industry around the world. It happens when dairy animals like buffaloes and other creatures associated with microorganisms in their environment (Muhammad et al., 2008). In Pakistan, mastitis has been recognized as a major problem for animals. To address this issue, ethnoveterinary medication can be a more reasonable and feasible elective to engineered medications. EVM includes utilizing home grown arrangements that have been customarily utilized by pastoralists and agriculturists for treating animal's maladies. One particular herb, *C. colocynthis* (L.) Schrad, has been detailed to be utilized for controlling mastitis. In India, it has been utilized as a galactagogue. The plant species most commonly reported include *Citrullus colocynthis* (L.) Schrad, *Lepidium sativum* L., *Allium sativum* L., *Sesamum indicum* L., *Capsicum annuum* L., *Citrus limon* (L.) Burm.f, *Zingiber officinale* Roscoe, *Curcuma longa* L., *Cuminum cyminum* L., *Triticum aestivum* L., *Rosa indica* L., *Centratherum anthelminticum* L., *Peganum harmala* L., and *Nigella sativa* L. (Takhar et al., 2004).

Antioxidant and Free Radical Scavenging Potential

Cancer prevention agents are substances that prevent against harm caused by reactive oxygen species (ROS), which are included in different maladies. These ROS, such as hydrogen peroxide and superoxide anions, can lead to oxidative stress and contribute to the betterment of various conditions like atherosclerosis, stroke, Alzheimer's diseaes, diabetes, and cancer. Furthermore, there has been increasing interest in normal cancer prevention agents, especially compounds found in plants like flavonoids and phenolic, due to their potential therapeutuc benefits. One plant of interest is *C. colocynthis*, particularly its seeds and natural products. Ponders have examined the antioxidant properties of diverse extricates from *C. colocynthis* seeds. The extricates were tried at a concentration of 2,000µg/ml employing a 1,1-diphenyl-2-picrylhydrazyl measure. The ethyl acetic acid derivation extricate appeared to be showing the most noteworthy antioxidant action with a lessening rate of 88%, taken after by the hydromethanolic extricate (HM) with 74%, and the rough watery extricate (E1) with 66%. Ascorbic corrosive, a known antioxidant, had an IC50 of 1µg/ml. These discoveries propose that *C. colocynthis* seeds have potential as a common antioxidant source (Gill et al., 2011).

Antiparasitic Insecticidal and Antiscorpion Effects

A study conducted from the Office of Pharmacology at Thi qar College in Nasiriyah, Iraq, pointed to examine the impacts *C. colocynthis* on creepy crawlies and scorpions. The analysts tried different extricates of *C. colocynthis* clears out against *Culex quinquefasciatus* hatchlings. The extricates included unrefined acetone, hexane, ethyl acetic acid derivation, methanol, and petroleum ether. After 24 hours of presentation, the petroleum ether extricate appeared the most noteworthy larval mortality. Advance investigation of this extricate driven to the distinguishing proof of two greasy acids, linoleic corrosive and oleic corrosive which displayed powerful larvicidal action against *Anopheles stephensi*, *Aedesaegypti* and *Culex quinquefasciatus* hatchlings. In expansion, the analysts tried diverse extricates of *C. colocynthis* natural products against *Aphis craccivora*. The ethanol extricate showed the most noteworthy insecticidal effect, and the extraction of the

recognizable compound, 2-O-β-D glucopyranosylcucurbitacin E, was encouraged, which shows the most extreme insecticidal impact (Torkey et al., 2009).

Moreover, *C. colocynthis* was evaulated as a promising preventive approach for scorpion envenomation, particularly against *Androctonus australis* hector poison. The analysis found that pretreating mice with *C. colocynthis* provide some time recently poison infusion given security against poison harmfulness. It decreased paw edema, cell relocation, exudation, hyperglycemia, and oxidative stretch. *C. colocynthis* too diminished certain incendiary markers and kept up the levels of particular proteins. A study proposes that *C. colocynthis* has antiparasitic, insecticidal, and antiscorpion impacts, making it a potential device for decreasing the pathophysiological impacts initiated by envenomation (Fatima et al., 2014).

Conclusion

This book chapter is about studying the nutrients and possible health benefits of *C. colocynthis* by looking at information from different academic sources. The study shows that *C. colocynthis* is a healthy fruit with many good effects on health. This fruit is really healthy having various benefits including antivenemous, antibacterial and several other properties as mentioned in the article in various sections. Its benefits are very vast but this is not well known among the people. So there is a need to improve the studies and spread the knowledge of the defectiveness of this plant.

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