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Medicinal Properties and Toxic Effects of the Seeds of *Abrus precatorius, Datura metel, Physostigma venenosum* and *Ricinus communis* used in Ethnomedicine in Nigeria: A Review

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ABSTRACT: Plants with medicinal properties are used all over the world for disease treatment. Poisonous phytochemicals (toxins) in some or all parts of these medicinal plants are the causeof the toxic effects exerted by some medicinal plants. The objective of this paper is to provide a review on themedicinal effects and toxic properties of the seeds of some medicinal plants (*Abrus precatorius*, *Datura metel*, *Physostigma venenosu*m and *Ricinus communis*) used in ethnomedicine in Nigeria by harvesting secondary data from standard online sources. This review gives collective reports on the medicinal properties of *Abrus precatorius*, *Datura metel*, *Physostigma venenosu*m and*Ricinus communis.* The uses of the toxins isolated from the seeds of these plants in medicine are also reported in this review. Significant amount of information has been provided.

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Globally, plants that have medicinal effects have been utilized in ethnomedicine from pre-historic era for prevention and treatment of diseases. In developing countries, medicinal plants are used between 65% and 80% of the populations (WHO, 2011). Medicinal plants exert therapeutic effects on humans and animals. They are used for the treatment of diseases which includes stomach ache, fever, head ache, hypertension, malaria, diabetes, pile, body pain and cough (Rakotoarivelo *et al*., 2015; Namdeo, 2018; Abubakar *et al*., 2022). Medicinal plants are also used for preventing diseases including cancer (Paul *et al*., 2011), hypertension (Ghasi *et al*., 2011), hyperlipidaemia, atherosclerosis and hyperglycaemia (Ozougwu and Eyo, 2011). All or some medicinal plants parts (leaves, seeds, roots, fruits, stem and flowers) are used as crude extracts or pure isolates (bioactive compounds isolated from medicinal plants) for disease treatment (Dawurung *et al*., 2021, Quenon *et al*., 2022; Saboon *et al*., 2019). There are reports from previous studies that medicinal plants exert therapeutic effect due to the presence of phytochemicals (Lee and Bae, 2017; Lee and Kim, 2016; Nyamai *et al*., 2016).Plants produce phytochemicals for self-protection but recent research shows that some phytochemicals can also be used for disease prevention/treatment and some may have toxic effect depending on the dose used for disease treatment or if they are toxins (Gadadhar and Karande, 2013;Kohnen-Johannsen and Kayser, 2019).Phytochemicals are plant bioactive chemical compounds that have beneficial health effects due to their great anti-oxidant potentials (Xinyi *et al*., 2022; Thakur *et al*., 2020).However, some phytochemicals are known to be highly toxic and such phytochemicals are called toxins. There are toxins that have health

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benefits in small doses but poisonous in large concentrations. Plant phytochemicals includes alkaloids, saponins, phenols and flavonoids (Agideus, 2022). Toxic effects which include stomach ache, fever, nausea and mortality may occur after intake of medicinal plants due to the dose taken and the presence of toxins in the plant part(s) (Worbs*et al*., 2011; Batiha*et al*., 2020). These have raised concerns on the safety (possible toxic effect) of medicinal plants due to its use in ethnomedicine. Thus, toxicity studies are carried out on medicinal plants in so as to determine if the plants are safe for use as medicines and also to determine the median lethal dose (LD_{50}) or lethal concentration in 50% of the population (LC_{50}). There are reports from previous studies on the LD_{50} and LC_{50} of some medicinal plants (Okereke *et al*., 2021; Sunday *et al*., 2013a; Muhammad *et al*., 2015; Manal *et al*., 2018). Also there are reports from previous studies on toxins with therapeutic effect isolated from some medicinal plants (Lopez*et al*. 2017; Bhutia and Maiti, 2011; Scheindlin, 2010).

Abrus precatorius, *Datura metel*, *Physostigma venenosum* and*Ricinus communis* are some of the plants with medicinal properties used in ethnomedicine in Nigeria for the treatment of numerous diseases including head ache, hypertension, diabetes, bronchitis, asthma, fever and inflammations. There are reports from literature that research works on therapeutic and toxic effect of these plants were carried out on the crude extracts or pure compounds isolated from all or some parts of the plants (Huiqin *et al*., 2022; Bhutia and Maiti, 2011; Proudfoot, 2006). Previous studies carried out on the seeds of these plants reported that, they are extremely toxic because of the high concentration of poisonous phytochemicals (toxins) in the seeds. Activity guided pharmacological studies carried out on the toxins isolated from the seeds of these plants reported that the toxins have therapeutic effect depending on the dose administered. Therefore, the objective of this paper is to provide a review on the medicinal properties and toxic effects of the seeds of some medicinal plants (*Abrus precatorius, Datura metel, Physostigma venenosum* and *Ricinus communis*) used in ethnomedicine in Nigeria.

MATERIALS AND METHODS

Articles that were published previously was searched using SCOPUS, Medline, Google Scholar, PubMed, Research Gate and Web of Science databases to extract the information about some toxic plants in Nigeria with therapeutic effect. The terms used for the search were "medicinal plants in Nigeria," "toxic plants with therapeutic effect," "parts of plants with medicinal property," "parts of plants with toxic effect" and "symptoms of some medicinal plants toxicity". Articles published online from year 2000 till date was included in this study.

RESULTS AND DISCUSSION

Medicinal plants with toxic properties: The plants *Abrus precatorius*, *Datura metel*, *Physostigma venenosum* and *Ricinus communis* are used in traditional medicine (ethnomedicine) for the treatment of numerous diseases (Table 1).

Table 1. Summary of medicinal plants with toxic seeds in Nigeria used in ethnomedicine.

Botanical name	Family	Common names in other parts of the world	Local names in Nigeria	Part used in ethno-medicine	Uses in ethno-medicine	References
Abrus precatorius	Fabaceae	Rosary pea and Crab's eye	Idonzakara in Hausa; Anya mumu in Igbo; and Oju-ologbo in Yoruba.	Leaves and seeds	Treatment of jaundice, hepatitis, abdominal pain, cough, diarrhea and gonorrhea.	Sunday *et al*., 2013a; Sunday *et al*., 2013b; Taur and Patil, 2011; Acharya, 2004.
Datura metel	Solanaceae	Angel's trumpet and Devil's apple	Zakami in Hausa; Myaramuo in Igbo; and Apikan in Yoruba.	The whole plant	Scabies, pile, eczema, mums, bronchitis, diabetes, and asthma	Nargish, 2022; Khaton and Shaik, 2012; Jamdhade *et al*., 2010; Yusuf *et al*., 2009; Agra *et al*., 2007.
Physostigma venenosum	Fabaceae	Calabar bean, Ordeal bean and Chop nut	Calabar bean	Seeds	Treatment of convulsion, tetanus, glaucoma; hypertension, constipation and epilepsy.	Aihiokhai and Erhabor, 2019; Scheindlin, 2010; Wickersham and Novak 2003.
Ricinus communis	Euphorbiaceae	Castor Plant and Palm of Christ	Zurman in Hausa; Ogili isi in Igbo; and Ilara in Yoruba	Leaves, roots and seeds	Treatment of diabetes, ulcer, eye infection; convulsion, fever, asthma.	Sandford *et al*., 2021; Ramanjaneyulu*et al*., 2017; Ladda 2014; Roxas-Duncan and Smith 2012; Rachhadiya*et al*., 2011; Dnyaneshwar, 2011; Tripathi *et al*., 2010; Shokeen *et al*., 2008.

Table 2.Toxic properties of the seeds of *Abrus precatorius, Datura metel, Physostigma venenosum* and *Ricinus communis* used in ethnomedicine in Nigeria.

Botanical name	Symptoms of toxicity	Toxin present in the seeds	Type of toxin	Medicinal uses of the toxin	References
Abrus precatorius	Severe abdominal pain, burning in the throat, nausea and vomiting.	Abrin	Toxalbumin	Treatment for killing cancer cells.	Sunday *et al*., 2013a; Sunday *et al*., 2013b; Bhutia and Maiti, 2011; Anam, 2001; Parrotta 2001
Datura metel	Constipation, ataxia, seizures and changes in heart rate.	Tropane	Alkaloid	It is used for sedation, treatment of muscle spasms and eye problems.	Kohnen-Johannsen and Kayser, 2019; Krenzelok, 2010; Nuhu, 2002.
Physostigma venenosum	Weakness of the muscles, cardiac arrest and rapid contraction of the heart muscles.	Physostigmine	Alkaloid	It is used for preventing damage to the optic nerve and countering toxicity in the central nervous system caused by anti-cholinergic medications	Batiha *et al*., 2020; Arens and Kearney, 2019; Wickersham and Novak, 2003.
Ricinus communis	Kidney failure, muscular pains, dyspnoea, liver failure, edema.	Ricin and Ricinine	Ricin is a toxalbumin. Ricinine is an alkaloid.	Ricin is reported to have Lipolytic activity. Ricinine is used for identifying intoxications that occur due to intake of crude plant extracts.	Heike *et al*., 2019; Waseem *et al.*, 2018; Lopez Nunez *et al*., 2017; Bhaskaran *et al*., 2014; Friedman and Rasooly, 2013; Darby *et al*., 2001; Lombard *et al*., 2001

Symptoms of toxicity, toxins and the medicinal uses of the toxins present in the seeds of *A. precatorius*, *D. metel*, *P.venenosum* and *R. communis* have been reported in previous studies carried out on the plants (Table 2). Also, toxicity studies carried out on the seeds of *A. precatorius*, *D. metel*, *P.venenosum* and *R. communis* have been reported (Table 3).*Abrus precatorius:* The plant *Abrus precatorius* is a herbaceous flowering plant that belongs to the family of Fabaceae.

The plant is found in tropical climates which includes West Africa, South Chaina and India. The seeds of *A. precatorius* are commonly known as Crab's eye and Jequirity pea, Rosary pea (Huiqin *et al*., 2022; Bhutia and Maiti, 2011) and Ojuologbo in south-western Nigeria (Table 1). *Abrus precatorius* is an annual plant that is slender and it has a high climbing vine. The leaves of *A. precatorius* are glabrous (hairless) with long internodes. The matured seed of *A. precatorius* is brilliant red with a hard, glossy and smooth seed coat (Bhutia and Maiti, 2011).

Toxicity of Abrus precatorius: A. precatorius is a plant that produces seeds that are beautiful and highly toxic (Bhutia and Maiti, 2011; Anam, 2001; Fernando, 2001). Abrin a toxalbumin is the toxin present in *A. precatorius* plant (Gadadhar and Karande 2013; Parrotta 2001). Abrin, a ribosome - inactivating protein inhibits protein synthesis there by leading to cell death (Gadadhar and Karande 2013; Bhutia and Maiti, 2011; Narayanan and Surendranath, 2005). Abrin toxicity symptoms include blood in stool, acute renal damage, seizures, tremor, vomiting, abdominal pain and nausea (Karthikeyan and Amalnath, 2017; Patil *et al*., 2016; Ganesan and Ettiyan 2015; Khanra *et al*., 2014). Overdose or usage of of *Abrus precatorius* seeds for a long period may result in toxicity due to the toxin Abrin present in the seeds (Table 2).

Medicinal uses of Abrus precatorius: A. precatorius is used in ethnomedicine for treating diseases which include diarrhea, skin infections, abdominal pain, sexually transmissible infections, dysentery, gonorrhea and malaria (Taur and Patil, 2011) (Table 1). There are reports from previous studies that *Abrus precatorius* have antitumor, antioxidant, antimicrobial, anti-inflammatory, anti-asthmatic, antidiabetic and antifertility properties (Huiqin *et al*., 2022; Chopra *et al*., 2020; Taur and Patil, 2011).

The seeds are used for treating cough, inflammations, gonorrhea, jaundice, malaria and eye problems (Huiqin*et al*., 2022; Acharya, 2004). The toxin Abrin has been reported to have the potential to kill cancer cells (Bhutia and Maiti, 2011) (Table 2).

Table 3. Toxicity studies carried out on the seeds of *A. precatorius*, *D. metel*, *P. venenosum* and *R. communis.*

Botanical name	Seed extract	Toxicity studies and route of administration.	Experimental animal used	Acute toxicity studies (Median Lethal dose [LD_{50}] and Median Lethal Concentration [LC_{50}])	Sub-chronic and sub-acute toxicity studies	References
Abrus precatorius	Methanolic extract.	Cytotoxicity test. Acute toxicity test via oral route (p.o.).	Brine shrimps.	LC_{50} = 169.36 µg/ml in Brine shrimps.		Maregesi *et al.*, 2016.
			Albino Mice.	LD_{50}>5000 mg/kg in Albino Mice. Histological examination showed nephrotoxicity and hepatotoxicity.		
	Aqueous extract.	Acute toxicity test via oral route and interperito-neal (i.p.) route.	Albino Mice.	LD_{50} is greater than 5000 mg/kg (via oral route) and 0.71 mg/kg (i.p.) in Albino mice.	14 days sub-acute toxicity studies in Wistar rats reported that degenerative changes were observed in the histology of the liver, lungs, intestines and kidney. Also the seed extract may possess moderate toxicity.	Sunday, 2022; Sunday *et al.*, 2013a; Sunday *et al*., 2013b.
		Sub-chronic toxicity studies via i.p.	Wistar Rats.	LD_{50} = 316.20 mg/kg (via oral route.) and 0.35 mg/kg (i.p.) in Wistar rats.		
Datura metel	Aqueous extract.	Acute and sub-chronic toxicity studies via oral rote.	Albino rats.	LD_{50}>5000 mg/kg.	28 days toxicity studies concluded that he plant extract may affect the red blood cells and it might have a negative effect on the kidney and liver.	Okereke *et al.*, 2021.
	Aqueous and methanolic extract	Sub-chronic toxicity study via oral route.	Wister rats		14 days toxicity concluded that the extracts may cause liver toxicity and it may induce inflammatory cellular infiltration within some regions in the liver.	Ikewebe*et al.*, 2023.
Physostigma venenosum	Ethanolic extract	Acute toxicity study via oral route.	Wister rats.	At higher dose level (20 mg/kg) the extract may be hematologically toxic. The acute toxicity study also concluded that the plant is not completely safe as oral remedy.		Aihiokhai *et al*., 2016.
	Ethanolic extract	Sub-chronic toxicity study via oral route.	Wister rats.		14 days sub-chronic toxicity studies concluded that doses higher than 20 mg/kg may be injurious to the liver when taken over a long period over time.	Aihiokhai *et al*., 2019.
Ricinus communis	Suspension using distilled water.	Acute and sub-chronic toxicity study via oral route.	Swiss Albino mice.	LD_{50} = 1587 mg/kg in Swiss Albino mice.	12 weeks sub-chronic toxicity studies in Albino rats concluded that the seed suspension is safe at upto 11.40 mg/kg.	Muhammad *et al*., 2015.
			Albino rats.			
	Ethanolic extract.	Acute and sub-chronic toxicity study via oral route.	Albino mice.	LD_{50} = 1100 mg/kg	10 days sub-chronic toxicity studies concluded that use of the extract for a long period may cause toxic effect.	Manal *et al*., 2018.
	Aqueous	Acute toxicity study via oral route.	Swiss Albino mice	LD_{50} = 547.72 mg/kg		Ubulom *et al.*, 2019.
	n-hexane	Acute and sub-chronic toxicity study via subcutaneous route.	Albino rats.	LD_{50} = 63.2 mg/kg	60 days sub-chronic toxicity studies concluded that the extract is relatively safe in rats.	Iornumbe *et al*., 2023.

Datura metel Linn: The plant *D. metel* belongs to the family of Solanaceae and it is commonly known as Stink weed, angel's trumpet, Jimson weed and thorn apple (Jamdhade *et al*., 2010). In Nigeria, *D. metel* is known as Apikan in Yoruba, Myaramuo in Igbo and Zakami in Hausa languages (Table 1). *D. metel* is found in tropical and sub-tropical areas which include Nigeria, Brazil, India and China (Khaton and Shaik, 2012; Pandey, 2003). The plant is a perennial shrub with simple leaves that are shallowly lobed, glabrous and oval in shape.

Toxicity of Datura metel: Extended usage or overdose of *Datura metel* L. plant (especially the seeds) may result in toxicity due to the presence of an alkaloid known as tropane (Krenzelok, 2010; Kohnen-Johannsen and Kayser, 2019) (Table 2).Several preclinical and clinical trials have reported that tropane alkaloid present in the plant is the cause of

deleterious and poison effect of *D. metel* (Krenzelok, 2010). The symptoms of tropane toxicity include changes in heart rate, pupil dilation, constipation, restlessness, ataxia, irritability, respiratory depression and seizures (Krenzelok, 2010) (Table 2). *Medicinal Uses of Datura metel: D. metel* flowers are used in ethnomedicine for the treatment of inflammations of the skin (Wang *et al*., 2008). *Datura metel*seeds are used in traditional medicine for treating skin rashes, bronchitis, ulcers, diabetes, pile and jaundice (Yusuf *et al*., 2009). The seeds are also used as a sedative (Agra *et al*., 2007). The whole plant is used for treating asthma and the leaves are used for the treatment of earache (Nargish, 2022; Khaton and Shaik, 2012). The seeds, leaves and roots are used for the treatment of insanity, fever, catarrh, diarrhea, skin diseases and cerebral complications (Khaton and Shaik, 2012) (Table 1). Reports from studies confirm the use of *D. metel* for the treatment of gouty arthritis (Umamaheswari, 2007). The plant is reported to have anticancer, hypoglycemic, antifungal, antioxidant, immunosuppressive, antibacterial and antiproliferative activities (Akharaiyi, 2011; Khan and Nasreen, 2010; Bajwa *et al*., 2008; Dabur *et al*., 2007; Pan *et al*., 2007;Ma *et al*., 2006; Dabur *et al*., 2005; Dabur *et al*., 2004; Murthy *et al*., 2004; Sharma, 2002). *Physostigma venenosum:* The plant *Physostigma venenosum* Balf. belongs to the family of Fabaceae. The plant is a native to a place known as Calabar in Nigeria. *Physostigma venenosum*is commonly known as esere nut, physostigma, Calabar bean,ordeal bean and chop nut (Proudfoot, 2006) (Table 1). The dried ripe seed of *P. venenosum* plant is known as calabar bean. The plant is a perennial, herbaceous, high climbing vine, with a woody stem woody at the base. *Physostigma venenosum* bears purple flowers and the seeds are enclosed ina dark brown pod. The seeds are dark brown and they have an extremely hard shell. The whole seeds of *P. venonosum* have numerous therapeutic properties. However, when used in excess, it is highly poisonous (Arens and Kearney, 2019).*Toxicity of Physostigma venenosum:* Calabar bean (the seeds of *Physostigma venenosum***)** produces alkaloids; the principal alkaloid is physostigmine, which is extremely toxic (Table 2). *P. venonosum* seed when taken in excess it causes cardiac arrest, muscle weakness and death (Batiha *et al*., 2020; Arens and Kearney, 2019). Symptoms ofPhysostigmine toxicity include seizures, nausea, abdominal pain, vomiting, blurred vision and bradycardia (Arens and Kearney, 2019) (Table 2).

Medicinal uses of Phystostigma venonosum: In traditional medicine *Phystostigma venonosum* seed is used for the treatment of convulsion, cholera, hypertension, tetanus and epilepsy (Aihiokhai and Erhabor, 2019). *P. venonosum* is used in ethnomedicine for the treatment of glaucoma and other eye diseases (Miguel *et al*., 2012; Scheindlin, 2010; Wickersham and Novak; 2003). Report from studies also showed that *P. venonosum* seed is used for the treatment of chronic constipation (Wickersham and Novak; 2003). Wickersham and Novak (2003) also reported that *P. venonosum* seed also acts on the circulatory system to slow down pulse and raise blood pressure. Studies also reported that *P. venonosum* seed boost the immune system (Aihiokhai *et al*., 2016).*P. venonosum* seeds are also used for the treatment of hallucinations, arrhythmias, hypertension, coma, myoclonic seizures and other anticholinergic drug overdoses (Proudfoot, 2006; Scheindlin, 2010) (Table 1 and Table 2). Phystostigmine, a reversible cholinesterase inhibitor alkaloid isolated from *P. venonosum* seed is reported to be responsible for the treatment of glaucoma after it is rapidly absorbed through the membranes when applied topically to the conjunctiva (Scheindlin, 2010). Physostigmine is a powerful stimulant used for the contraction of muscles (Miguel *et al*., 2012; Scheindlin, 2010; Wickersham and Novak; 2003). Physostigmine is a potent antidote for the treatment of anticholinergic poisoning (Proudfoot, 2006).

Ricinus communis: The plant *Ricinus communis* Linn is a shrub belonging to the Family Euphorbiaceae and itis popularly known as Castor Plant and Palm of Christ (Roxas-Duncan and Smith, 2012). In Nigeria *Ricinus communis*is commonly known as Ilara in Yoruba, Ogili isi in Igbo, Zurman in Hausa (Table 1).The plant is found in tropical and temperate regions including Germany, India, Brazil, Egypt and Africa (Serpico and White, 2000; Heike *et al*., 2019). The leaves of *Ricinus communis* have deep lobes with coarsely toothed segments which are alternate and palmate (Jena and Gupta 2012). The stems have different pigmentation and the bean-like seeds are shiny with variable brownish mottle and the seeds also have a warty appendage (Bradberry *et al*. 2003; Jena and Gupta, 2012; Trease and Evans, 2002).

Toxicity of Ricinus communis: The seeds of *Ricinus communis* are poisonous due to the presence of highly toxic substances such as ricin and ricinine (Liang *et al*., 2021; Heike *et al*., 2019) (Table 2). Ricin a type 2 ribosome inactivating protein is highly cytotoxic and it causes cell death (Liang *et al*., 2021).Symptoms of ricin toxicity include abdominal pain, kidney failure, muscular pains, dysponea, circulatory collapse, dehydration, liver failure, edema, hemorrhagic necrosis in heart and intestine (Waseem *et al*.,2018;

Friedman and Rasooly, 2013; Bhaskaran *et al*., 2014) (Table 2). Ricinine is an alkaloidal toxin that translocates in the plant depending on the age (Worbs*et al*., 2011). Ricinine causes chronic seizures and cell death (Ferraz *et al*., 2002). There are reports that ricinine can be used for identifying intoxications caused by crude extracts of plants (Darby *et al*. 2001; Lopez *et al*., 2017) (Table 2).

Medicinal uses of Ricinus communis: The plant *Ricinus communis*isused in ethnomedicine for the treatment of diseases (Table 1). *Ricinus communis*seeds are used in Nepal as an oral contraceptive (Heike *et al*., 2019). The leaves have hepatoprotective, antinociceptive, anti-inflammatory, anticonvulsant and analgesic activities (Ladda 2014; Princea *et al*., 2011; Taur *et al*. 2011; Anil *et al*., 2010; Tripathi *et al*., 2010; Ilavarasan *et al*., 2006). The root have Antidiabetic, antiasthmatic and antimicrobial activities (Dnyaneshwar *et al*., 2011; Abhishek *et al*., 2011; Islam *et al*., 2010; Shokeen *et al*., 2008). The seeds have anti-fertility activity (Sandhyakumary, 2003). Castor oil from *R. communis* seed possess, antiulcer and wound healing activities (Nath *et al*., 2013; Rachhadiya *et al*., 2011; Prasad*et al*., 2011). *Ricinus Communis* oil is alsoused for cleaning the eyes for better visualization (Sandford *et al*., 2021; Ramanjaneyulu *et al*.,2017).*R. communis* have been found to have antimicrobial, antifungal and anti-cancer properties (Saha *et al*., 2016; Abd-Ulgadir *et al*., 2015; Abew *et al*., 2014; Vandita *et al*., 2013; Ravishankar *et al*., 2012). There are reports from previous studies that *R. communis* have anti-inflammatory, antioxidant, analgesic, anticonvulsant, anti-fertility, anti-helminthic, bone regeneration, laxative and uterine contracting activities (Ziaei *et al*., 2016; Nath*et al*., 2015; Nemudzivhadi and Masoko 2014; Rana *et al*., 2013; Tunaru *et al*., 2012; Lindauer *et al*., 2010; Tripathi *et al*., 2010; Singh *et al*., 2009; Elimam *et al*., 2009; Almeida *et al*., 2001; Isichei *et al*., 2000).

Conclusion: The medicinal use of *Abrus precatorius*, *Datura metel*, *Physostigma venenosu*m and *Ricinus communis* in ethnomedicine and the toxic compounds (toxins) responsible for the toxicity of the seed of these plants were discussed in this review. Toxicity symptoms caused by the toxin(s) present in the seed of these plants and the use of the toxins in medicine was also discussed in these review. Previous studies carried out on these plants confirmed some of the medicinal properties of these plants, the toxins responsible for the toxic effect of the seeds and the medicinal effects of the toxins isolated from *Abrus precatorius*, *Datura metel*, *Physostigma venenosu*m and *Ricinus communis* seeds. Further studies are recommended to be carried out on other medicinal plants reported to have toxic effects so as to isolate and evaluate the possible therapeutic activity of the toxins responsible for the toxic effects of the plants.

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Data Availability Statement: Data are available upon request from the corresponding author.

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