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Research Article

Assessment Of Phytochemical Constituent And Antioxidant Capacities Of Ricinus Communicus Seed Extracts

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ABSTRACT

This study primarily aims to examine the antioxidant properties and phytochemical composition of several solvent extracts of *Ricinus communicus* seed. solvents such as water, ethanol, and petroleum ether were used to extract the seeds of *Ricinus communicus*. A variety of compounds were identified in the plant extracts like glycosides, steroids, alkaloids, terpenoids, phenols, tannins, and saponins. After analyzing the data, it was determined that the DPPH activity varied between 52.81±0.015 and 89.36±10 percent. As for the FRAP activity, it was discovered that the aqueous extract had a value of 0.57±0.10, the alcohol extract had a value of 0.72±0.01, on a contrary petroleum ether extract of *Ricinus communicus* shows 0.84±0.015 FRAP activity. The ethanol extract's anti-oxidant activity was 78.5 ± 0.01 mg/g, High total anti-oxidant capacity of 92.5 ± 0.05 mg/g. in petroleum ether extract. The petroleum ether has 3.95 ± 0.10 mg GA/g of total phenolic content, while the ethanol extract's values were 2.95 ± 0.015 mg GA/g. The results showed that each extract had antioxidant potential while the Petroleum ether extract exhibits stronger antioxidant activity as compared to ethanol and aqueous extracts. This investigation is beneficial for the development of medicines, nutraceutical, and cosmetic industry.

Keywords: *Ricinus communicus*, Phytoconstituents, Antioxidant activity, DPPH

1. Introduction

Several plant materials have nourishing potentials are being used in folklore medicine owing to their safety and availability [1]plants were held as a significant source of medical materials that are used widely for treating or evading disease.[2] Herbal components are believed to have been nontoxic and more effective than conventional chemical equivalents. The routine use of herbal products by pregnant and lactating mothers without alertness of their effects may create dangers to fetus and mother create problems such physical and mental retardation of the fetus as premature delivery, abortion, uterine bleeding[3]. The purpose of current research is to examine the potential medicinal uses of Ricinus communis [4]. Important possibility that entire plants may be utilized globally in bioterrorism. The primary ingredient in plants ricin is very harmful to humans, animals, and insects and is commonly involved in suicide, homicide, and unintentional deaths[5]. The plant Ricinus communis is a plant belongs to family of Euphorbia[6]. Seeds of this plant scattered in the agricultural soil and rivers water[7]. Various bioactive compounds found in R. communis may offer scientific proof of the plant's therapeutic efficacy as well as other biological properties[8]. Plant extracts from various parts have in recent times showed bioactivities against a variety of diseases including diabetes, paralysis, constipation, pain, and wound infections. This shows that the plant has therapeutic qualities. Also, it works well as an anti-inflammatory, hepatoprotective, antioxidant, and anticancer agent[9-16]. Various phytoconstituents, including as steroids, glycosides, alkaloids, anthraquinones, tannins, saponins, polyuronides, flavonoids, terpenoids and reducing sugars, are responsible for their medicinal uses[17,18,19]. Because antioxidants have such an immense impact on

the well-being and health of humans, they have gained a lot of attention in more recent scientific studies. This research aims to increase awareness regarding antioxidants while finding methods for improving their beneficial effects[20]. free radicals and their associated species can cause severe impairment in biomolecule cells, proteins, lipids, Deoxyribonucleic Acid, and celluloses resulting in damage the cell[21]. Antioxidants are necessary because they destroy free radicals, lessen the effects of oxidative stress, and have the potential to inhibit the development of certain diseases, including those that are associated with aging, cardiac issues, and cancer. As a result of this increasing emphasis on antioxidants, researchers have been investigating a wide range of natural sources in search of phytochemicals that could be of potential use[22]. Bioactive compounds known as antioxidants slow down or completely stop oxidation processes that are caused by reactive oxygen species (ROS) or ambient oxygen enzymes[23]. Through the illumination of these antioxidant characteristics, our goal is to enhance comprehension of their possible medicinal and preventive uses in fostering general well-being and extending life expectancy. Research conducted in the scientific community has revealed a significant amount of interest in the antioxidant activity that can be found in various components of *Ricinus communicus*[24]. The goal of the resent work was to analyze the phytoconstituents present in *Ricinus communicus* seed extract using aqueous, ethanol, and petroleum ether and evaluate their antioxidant activity.

2. Materials and method

2.1. Collection

We collected specimens *Ricinus communicus* seeds from an agriculture shop at Akluj, Maharashtra. Seed was authenticated by Dr. D.L. Shirodkar, Botanist, Botanical Survey of India, Western Regional Centre, Koregaon Road, and Pune-411001. (Reference: No.BSI/WRC/lden. Cer. /2022/2901220010676) (2).

2.2. Extraction of seed

The seeds were collected, cleaned in distilled water, and then let to dry at the room temperature. After that, grind the dry seeds into a fine powder. The seed powder is sequentially extracted using water, ethanol, and petroleum ether in a Soxhlet extractor. In extraction process, 100 grams of seed were utilized. All extracts were dried in a revolving vacuum evaporator that was set at 40 °C. All the extracts were immediately stored in the dark until they were analyzed. This was done after they had been dried to the necessary degrees. A variety of phytoconstituents were found with conventional techniques.

2.3 Preliminary Phytochemical Analysis of *Ricinus communicus*

The analysis of phytochemicals presents in the seed extract of *Ricinus communicus* by using solvents like water, ethanol, and petroleum ether to observe constituents like alkaloids, terpenoids, steroids, tannins, saponins, glycosides and amino acids was tested using standard procedures [25] and the results are presented in Table 1.

2.4. Anti-oxidant Activity of *Ricinus communicus* seed

2.4.1. DPPH Radical Scavenging Activity:

It was determined that Ricinus communicus seed could scavenge free radicals by using the DPPH assay. A total of five milliliters of a 0.004% DPPH radical solution were combined with seed extract solutions that ranged in concentration from 0.2 to 10 mg/mL. Following the completion of the vortex mixing process, the mixtures were allowed to sit for a thirty-minute period at room temperature in the dark. A spectrophotometer (Shimadzu UV-Mini 1240, UV/Vis) was utilized to ascertain the optical density (OD) at a wavelength of 517 nm[26]. It was methanol that was used as a blank. The absorbance of DPPH was indicated by control.

2.4.2. Ferric-reducing antioxidant power (FRAP)

For a test of antioxidant power that lowers ferric iron in a volumetric flask with a 1000 mL capacity, the samples (500 µL) were combined with 120 µL of phosphate buffer (pH 7), that was obtained using dibasic potassium phosphate (61.5 mL, 1 M), monobasic potassium phosphate (38.1 mL, 1 M), and water. For obtaining uniformity, 220 µL of 1% potassium ferrocyanide (C6FeK4N6) was added to the mixture and incubated for 20 minutes at 500C. Next, 45 µL of distilled water, 10 µL of 0.1% ferric chloride, and 12 µL of 10% trichloroacetic acid were added. The wavelength that was used to measure the absorbance was determined was 734 nm. Using gallic acid calibration curve was plotted[27].

2.4.3. Total phenolic content assay.

For this test, 0.2 milliliters of extract were mixed with 0.2 milliliters of the 10% Folin-Ciocalteu solution, and the mixture was then placed in a dark area for four minutes. One milliliter of a 15% sodium carbonate solution was added, and the mixture was stirred for four minutes before being left at room temperature and out of the light for a period of 30 minutes. After that, the solution was placed inside a cuvette, and a UV/Vis spectrophotometer was used to measure the absorbance at 760 nm. The study performed in triplicate. The gallic acid equivalent (GAE), a measurement of the total phenolic content of Ricinus communicus seed, was estimated in this work using an equation derived from a reference that employed various amounts of gallic acid[28].

2.4.4. Total Anti-oxidant Capacity

Total Antioxidant Capacity The mixture was incubated in a water bath at 695 nm for 90 minutes at 95 °C while measuring the absorbance. 3 milliliters (100 mg/ml) of the extract, 0.6 M H_2SO_4, 28 mM sodium phosphate, and 4 mM ammonium molybdate were the reagents used. Ascorbic acid 0.1mg/ml is used as standard; the data was provided as mg/g[29].

3. Results and discussion

3.1 Preliminary Phytoconstituents analysis of Ricinus communicus

Phytochemical analysis was done on Ricinus communicus seed extracts in water, ethanol, and petroleum ether. The secondary metabolites identified in the different extracts are listed in Table 1. Ricinus communicus seed crude ethanolic and petroleum ether extract showed very positive outcomes for the presence of phytochemicals. Only amino acids, glycosides, and saponins showed significant advantages of the aqueous extract.

Table. 1: phytochemical analysis of Ricinus *communicus* seed extract

Phytoconstituents	Aqueous extract	Ethanol extract	Petroleum ether extract
Terpenoids	-	+	+
Steroids	-	+	+
Glycosides	+	+	+
Saponin	+	+	+
Alkaloids	-	+	+
Phenol and tannins	-	+	+

+ = Present, - = Absent

3.2. Antioxidant activity:

A distinct method was utilized to determine DPPH, the total antioxidant capacity TAC, ferric reducing antioxidant property FRAP, and Total phenolic content of *Ricinus communicus* using aqueous, ethanolic, and pet. ether extracts**.** The results of these measurements are presented in Table 2.

Table 2: Results of antioxidant activity

Extract	DPPH (% inhibition)	FRAP (mg/g)	Total antioxidant capacity (mg AA/g)	Total Phenolic content (mg GA/g)
Aqueous extract of Ricinus communicus seeds (g)	52.81±0.015	0.57±0.010	56.5±0.10	1.60±0.015
Ethanol extract of Ricinus communicus seeds (g)	71.10±0.15	0.72±0.10	78.5±0.01	2.95±0.015
Petroleum ether extract of Ricinus communicus seeds (g)	88.50±0.10	0.84±0.015	92.5±0.05	3.95±0.10
Std. Ascorbic acid	89.36±0.10	-	98.50±0.05	-
Std. Gallic acid	-	0.78±0.10	-	3.98±0.10

Average values of the observations and standard deviation (SD) ±

In the DPPH assay, the antioxidant properties of the Ricinus communicus extract are evaluated in terms of their ability to function as radical proton scavengers. The anti-oxidant potential of many different Ricinus communicus extract extracts were investigated as part of this investigation. In comparison to ethanol and aqueous extract, the DPPH activity of petroleum ether extract was found to be the greatest (Fig.1)

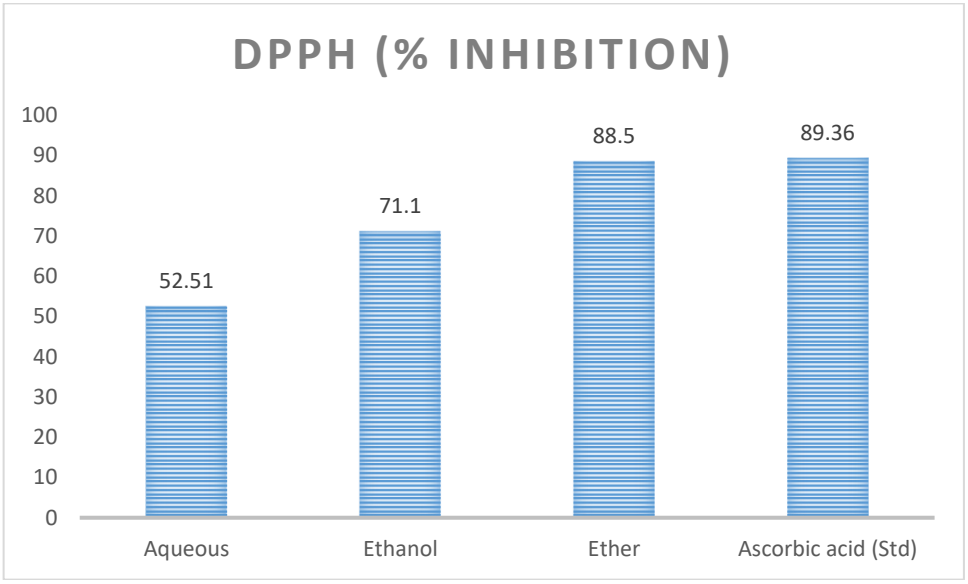

Fig.1. DPPH Radical Scavenging Activity of *Ricinus communicus* seed

Both the ethanol extract and the petroleum ether extract showed significant quantities of ferric reducing antioxidant property, although the petroleum ether extract has a higher concentration of this property than the aqueous and ethanol extract (Fig.2).

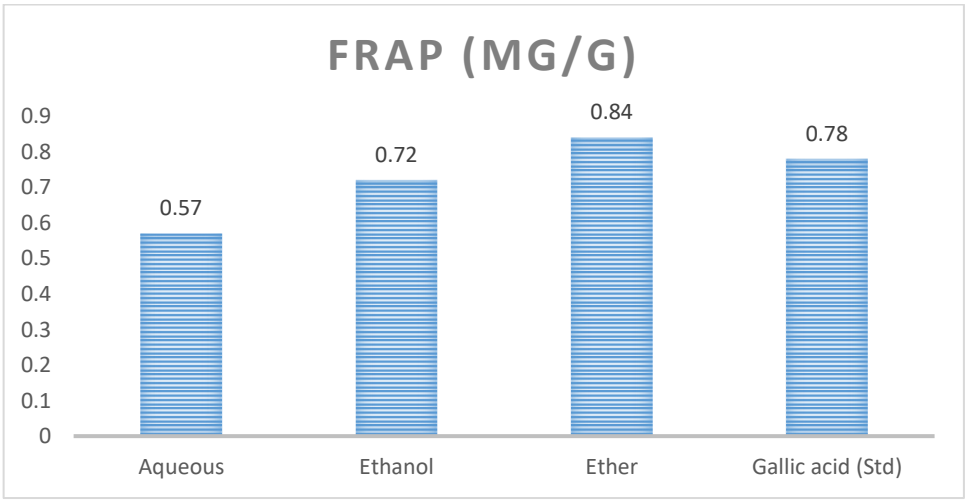

Fig.2. Ferric Reducing Antioxidant Property of *Ricinus communicus* seed

An ethanol extract has a low level of antioxidant activity (78.5± 0.01 mg/g), the aqueous extract has a moderate level (56.5± 0.10 mg/g), and the petroleum ether has a high level (92.5±0.05 mg/g). The finding of the total antioxidant potential in the different extracts of *Ricinus communicus* were observed in Figure 3.

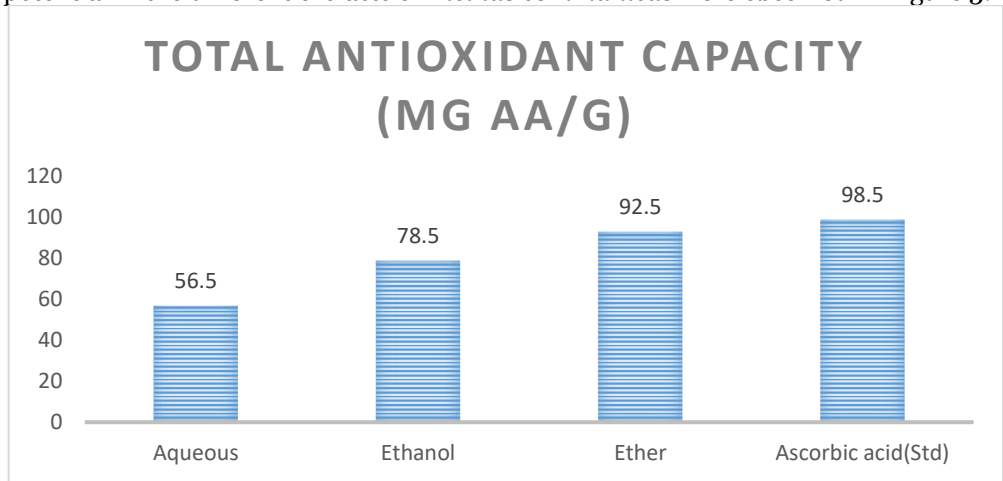

Fig.3. Total Anti-Oxidant Capacity of *Ricinus communicus* seed

The phenolic concentration of the aqueous extract is lower than that of the ethanol and petroleum ether extracts (Fig. 4). The phenolic content in the ethanolic extract of *Ricinus communicus* was found to be 2.95±0.015 mg/g, but the total phenol content in the petroleum ether extract was 3.95±0.10 mg/g. In comparison to ethanol and pet. ether extract, the phenolic concentration in aqueous extract is low. Figure 4 shows the total phenolic content of several *Ricinus communicus* seed extracts.

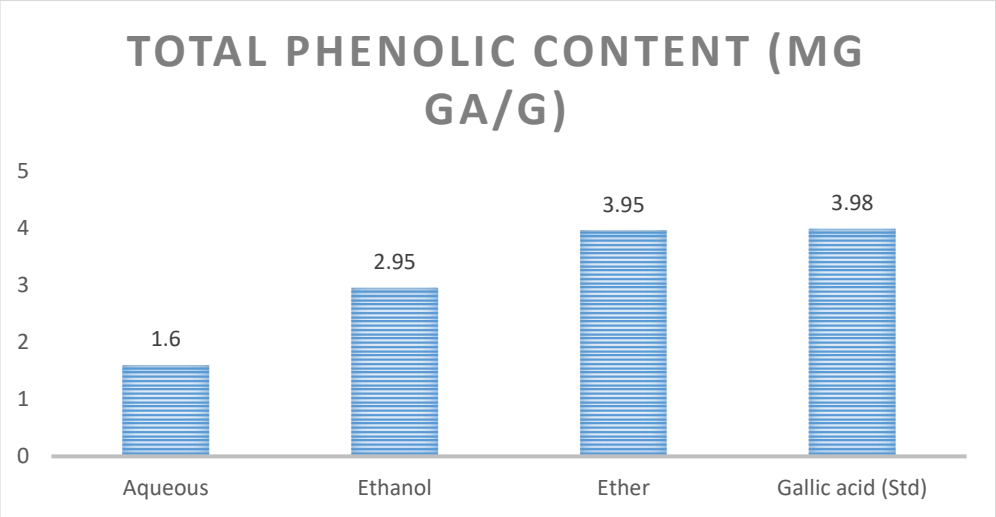

Fig.4. Total Phenolic content (TPC) of *Ricinus communicus* seed

4. Conclusion

The fact that extracts of Ricinus communicus have been shown to possess antioxidant activity serves to highlight the plant's potential as a promising source of natural antioxidants. These extracts were subjected to several diagnostic procedures, including DPPH and FRAP assays, Total antioxidant capacity (TAC), and Total phenolic content (TPC) and the results showed that they have high antioxidant capacities. The presence of powerful phytochemicals, in particular phenolic substances such as flavonoids and phenolic acids, makes a significant contribution to the antioxidative potential of the plant. The greater antioxidant capacity that was detected in some extracts, most notably the extract of petroleum ether, demonstrates the prospective function that it plays as a rich source of antioxidants. These findings highlight the significance of Ricinus communicus as a natural reservoir of bioactive chemicals, which has major implications for the pharmaceutical, nutraceutical, and food industries in terms of utilizing the inherent antioxidant qualities of the plant. There is a significant possibility that the development of health-promoting goods and therapies might be significantly aided by further investigation and application of these antioxidant-rich extracts.

5. Conflict of Interests

There are not any conflicting interests, the authors suggest.

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