SHORT COMMUNICATION

Antioxidant potentiality of *Artemisia absinthium* from Handwara region of Jammu and Kashmir

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ABSTRACT

Artemisia absinthium, commonly known as wormwood, (Tyethwan) is well known medicinal plant for its extensive used in traditional ayurvedic medicine for treating hepatitis, wound healing and jaundice. The aim of this study was to conduct antioxidant potentiality of Artemisia absinthium from Handwara region of J&K. Phytochemical analysis demonstrated high content of phenolic (4.9925 mg GAE/g) and flavonoidal compounds (45.375 mg QE/g). The DPPH assay results depicted an IC50 value of 23.9742 µg/mL indicating significant free radical scavenging ability, comparable to standard antioxidants such as ascorbic acid. This study validates the traditional medicinal uses of A. absinthium and establishes its potential as a natural source of antioxidants. These findings suggest that A. absinthium could be further explored for therapeutic applications, contributing to the development of natural antioxidant formulations for health and well-being.

Keywords: Antioxidants, *Artemisia absinthium*, phytochemical analysis

Medicinal and aromatic plants continue to play important role in ensuring health security of the nation and world (Rathore 2025). The therapeutic potential of medicinal plants is attributed to their complex chemical composition, which include a wide range of bioactive compounds, including phenolics, terpenoids, and flavonoids. *Artemisia absinthium* is a member of the Asteraceae family, one of the most significant polymorphism taxa in the field of pharmacology. Most of the plants in this category are located in temperate regions of the northern hemisphere, but there are a few species that can also be found in southern hemisphere. Plants have tendency to produce numerous secondary metabolites that occur naturally and are significant in pharmacology. These necessary metabolites, which may carry essential oils, saponins, flavonoids, and glucosinolates (Watson *et al*., 2002), are primarily used to combat various illnesses like cancer, inflammation, bacterial, viral, and fugal related infections. *Artemisia absinthium* that originates from the temperate regions of Eurasia and Northern Africa is found in Kashmir also at the elevation of 2100 meters (Javed e*t al*., 2012). It has hairy, ribbed stems and silvery, pinnatifid leaves. The flower heads are heterogamous, with female ray florets and hermaphrodite disc florets, surrounded by long white hairs. The marketed drug appears as grayish-white fragments of broken leaves,

flower heads, and hairy twigs with ridged branches (Sharopov e*t al*., 2012).

The fresh and healthy plants of *Artemisia absinthium* were collected from Handwara region, an area between Baramulla and Kupwara zone of Union territory of Jammu and Kashmir an average elevation of 1,582m (5,190ft) above sea level for research purpose. The plant material was maintained and stored at Department of Plant Science, School of life sciences, Central University of Himachal Pradesh, Shahpur Campus (Himachal Pradesh).

For Phytochemical analysis Folin-ciocalteu reagent -FCR, Gallic acid (standard), Sodium carbonate, Methanol, distilled water, Quercetin, Aluminium chloride, DPPH (2,2--Diphenyl-1-picrylhydrazyl) Ascorbic acid, Sodium phosphate, Ammonium molybdate, Sulphuric acid, Sodium nitrite, Sodium hydroxide etc were used. The sample was collected from the forests of Galganzer. The sample was dried in shade and powder was obtained by grinding the sample with a mortar and pestle. The sample that had been pulverized and dried was macerated in methanol for 72 hours at room temperature (28 ± 2 ◦C) with periodic shaking. Once the extraction was completed it was filtered and was reextracted using the same procedure and solvent. The residue obtained was stored in refrigerator.

The total phenolic content in the methanolic extract of *A. absinthium* was determined following the method described by Bhat *et al.* (2018). In a test tube, 100 µL of the *A. absinthium* extract was mixed with 3 mL of Folin-Ciocalteu reagent that was diluted in the ratio of 1:9, shaken thoroughly, and left to stand for 10 minutes. Then, 7.5 g of Na_2CO_3 was added to the mixture

The technique called aluminium chloride colorimetric (Bhat e*t al*., 2018) was incorporated to evaluate total flavonoid content (TFC). 100 µl of plant extract was taken. 150 µl of sodium nitrate and 150 ml of 2 percent aluminium chloride solution were added, shaken well and allowed to settle for 6 min. Then added 1ml sodium hydroxide, the mixture was left to stand for 30 min at room temperature while being periodically shaken. Using a spectrophotometer, the mixture's absorbance was measured at 510 nm. The content of total flavonoids was expressed as mg of quercetin equivalents (QE) per g of the extract.

The free radical scavenging activity of the extracts were examined using 2,2-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging technique (Bhat e*t al*.,2018). Mixture was left for 30 min.The absorbance of solution was recorded at 517 nm by using spectrophotometer. Percentage inhibition was then computed using the following formula**:**

$$\%I = \frac{A^{Control} - A^{Sample}}{A^{control}}$$

Where A (control) denotes absorbance of the test compound and A (sample) represents absorbance of the control which contains all of the chemicals except the test compound. The IC50 value was calculated using the scavenging percentagae versus concentration. The average IC50 value was computed.

The total antioxidant capacity of *A.absinthium* extracts was measured by phosphomolybdate assay (Phillips e*t al*.,1994). 100 µl of the plant extract were mixed with 3 mL of the reagent solution (0.6 M sulphuric acid, 28 mM sodium phosphate and 4 mM ammonium molybdate). The tubes were capped and then incubated at 95 ◦C for 90 min. After which the samples were left to cool down the absorbance of the mixture was measured at λ 695 nm using a UV spectrophotometer against a blank. After calculation, the extracts' overall antioxidant capacity was reported as milligrams of ascorbic acid equivalents (mg AAE/g) of dry weight.

To quantify the amount of phenol present in the *A. absinthium* extract the total Phenolic content test was done using Folin – Ciocalteu (FCR) method. The amount of phenolic content was evaluated using the standard curve equation: $y = 0.0185x +$

0.3746, $R^2 = 0.9671$, where y is the absorbance at 765nm and x is the total phenols in the *A. absinthium* extract (mg/ml). Total phenolic content of extract was 4.9925mgGAE/g. The results of the comparative analysis of phenolic content were quite lesser than the study conducted by (Bhat e*t al*.,2018) with values 24.31mgGAE/g.

To quantify the amount of flavonoid present in the *A. absinthium* extract the total flavanoid content test was performed using Alumunium chloride method. The amount of flavonoid content was estimated using the standard curve equation: $y = 0.0022x + 0.01066$, $R^2 = 0.9717$, where y is the absorbance at 510nm and x is the total phenols in the *A. absinthium* extract (mg/ml). Total Flavonoid content of extract was 45.375mgQE/g. The results of the comparative analysis of flavonoid content were quite agreeable to the study conducted by (Bhat e*t al*.,2018) with slight difference in values i.e. 39.52mgQE/g. Phenolics and flavonoids, directly contribute to the antioxidant capacity of plants (Sanket e*t al*.,2025).

The free radical scavenging activity of the *Artemisia absinthium* extracts were examined using 2,2-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging technique. DPPH is a free radical and have a deep violet colour, when it gets reduced its colour change to yellow and became DPPH-H.

The maximum per cent radical scavenging activity is obtained at 25µg/ml concentrations of methanol extract of *Artemisia* and lowest at 5µg/ml. With an IC50 value of 23.9742µg/ml (Figure 1). The results of the comparative analysis were quite higher than the study conducted by (Bhat e*t al*., 2018) with values IC50: 14.88µg/ml. The maximum per cent radical scavenging activity is obtained at 25µg/ml concentrations of Ascorbic acid (standard use) and lowest at 5µg/ml (Figure 2). The percent RSA increases as the concentration of the substance increases, indicating that the substance has a higher radical scavenging activity at higher concentrations. The IC50 value is 33.32 µg/ml, which is the concentration required to achieve 50 percent RSA.

For both the plant extract and ascorbic acid, the percent RSA increases with the concentration. At all concentrations (5, 10, 15, 20, and 25 µg/ml), the plant extract shows consistently high percent RSA, around 70 percent.. The percent RSA for ascorbic acid is significantly lower compared to the plant extract at all tested concentrations. At 5 µg/ml, ascorbic acid shows around 20 percent RSA. The percent RSA increases gradually, reaching around 35 percent at 25 µg/ml. The plant extract demonstrates a much higher antioxidant potential compared to ascorbic acid across all tested concentrations.

The phosphomolybdenum technique was used to test the spectrophotometric antioxidant capability of the *Artemisia absinthium* extracts, with a maximum absorption calculated at 695 nm (Figure 3). Ascorbic acid equivalents (AAE)/gram of dry weight plant material were used to represent the antioxidant capacity of the *A. absinthium* extracts. The reported total antioxidant capacity for AAE was 10.71425mg AAE/g. The results of the comparative analysis were quite higher than the study conducted by (Phillips e*t al*.,1994) with values3.57mg AAE/g.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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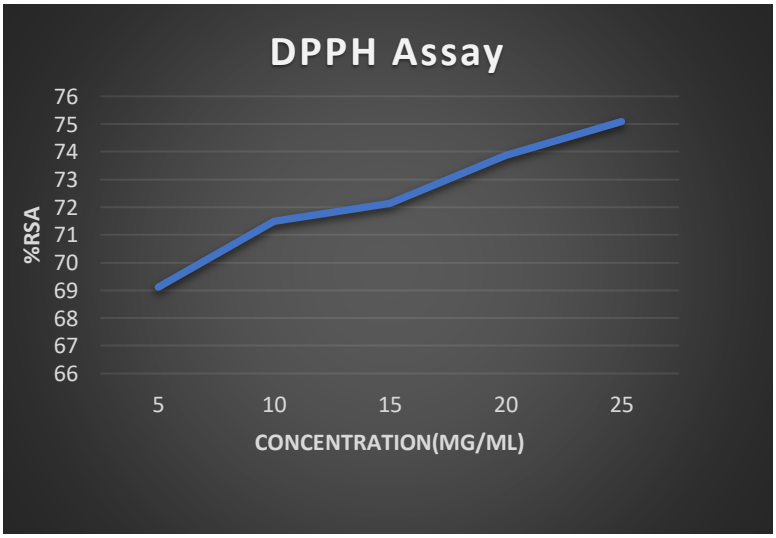

Figure 1: **Graph is plotted between concentration (µg/ml) on X axis and % Radical Scavenging Activity on Y axis**

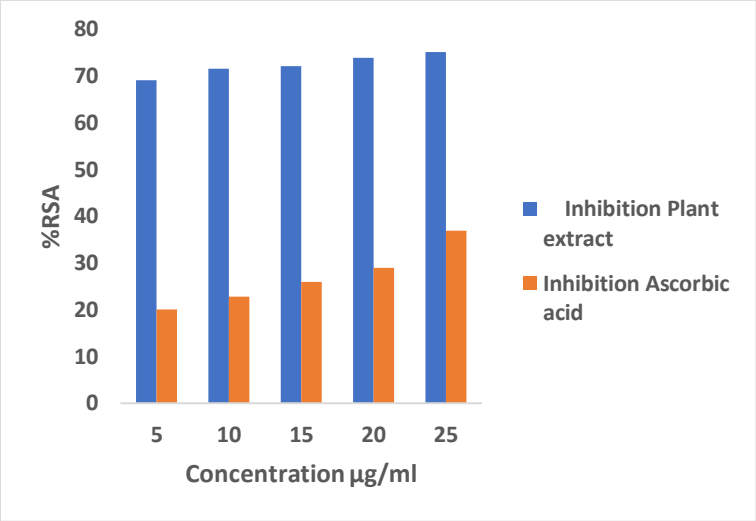

Figure 2: **Comparative analysis of DPPH Assay**

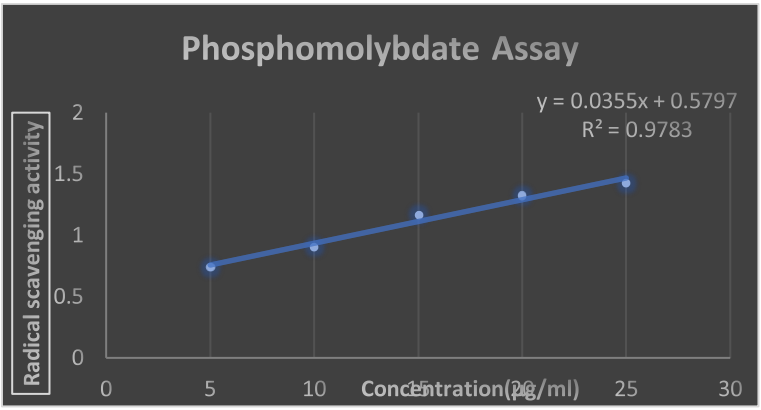

Figure 3: Graph is plotted between concentration (µg/ml) on X axis and % Radical Scavenging Activity on Y axis.