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# Phytochemicals Screening and Antioxidant Activity of Different Extract of *Brassica oleracae*

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**Abstract**

Medicinal plants are the important bioactive compounds against various oxidative degenerative diseases. The present study is to evaluate the preliminary phytochemical analysis and antioxidant activity of aqueous (AQWBa) and methanolic (MEWBa) extract of *Brassica oleracea* (White Cabbage). The results of phytochemical screening of aqueous and methanolic extract of *Brassica oleracea* (White Cabbage) revealed the presence of some secondary metabolites like alkaloids, carbohydrates, flavonoids, steroids, terpenoids, tannins, quinones, phenols and absence the bioactive compounds namely saponins and glycosides. The results of DPPH radical scavenging activity showed the $IC_{50}$ range of methanolic extract of *Brassica oleracea* (White Cabbage) were found to be 40.23µg when compared to control ascorbic acid 43.51µg and aqueous extract 48.20µg were respectively. From the data obtained, it can be concluded that the white cabbage of *Brassica oleracea* can be used as a possible source of treatment for problems associated with oxidative stress as well as strong anticancer activity.

**Keywords:** *Medicinal plants, Brassica oleracea, Phytochemicals and Antioxidant activity.*

## 1 Introduction

Plants are a major source of medicine with a variety of biological deliberations, including phytochemicals and antioxidant activities [1]. Almost 25% of conventional drugs and primary health care of majority of world population relies essentially on plants. Natural antioxidants are broad-spectrum, safe and effective in regulating destructive processes triggered by oxidative stress, induced by free radical's overproduction [2]. Phytochemicals are beneficial to boost up immunolatory responses and also provide immunity against many diseases. Some phytochemicals are known to reveal medicinal and physiological activities which are phenols, tannins, flavonoids, saponins, carbohydrates, alkaloids and phytosterols [3].

Therapeutic or curing activities of plants were conventionally proclaimed to have medicinal properties by small researchers. In worldwide medicinal plants the presence of phytochemicals checked in recent researches [4]. So because of the presence of bioactive constituents medicinal plants show these medicinal properties. Antioxidant is defined as a substance which oxidizes any other substance or molecule in the presence of oxygen or other reducing agents. On the contrary, an antioxidant is a reducing agent which stabilizes oxidants by donating electrons or protons towards the oxidant [5].

White cabbage (*Brassica oleracea*) is *Brassicaceae* family, cabbage is naturally consumed either raw or boiled, fermented and salds. Cabbage has many bioactive compounds like phenolic acids, flavonoids, tannins, terpenoids and fiber. Cabbage is a rich source of vitamins and amino-acids. Cabbage is used as one of the precursors for the separation of medicine to inhibit various diseases such as urinary infection and respiratory systems. Cabbage is one of the most essential vegetables and grown worldwide countries. "The different cultivated types of cabbage show great variation in respect of size, shape and color of leaves as well as the texture of the head. Approximately 6.3 kg of *Brassica* vegetables are consumed per person annually [6]. The present study was carried out to establish the preliminary phytochemical analysis and antioxidant activity of aqueous (AQWBa) and methanolic (MEWBa) extract of *Brassica oleracea* (White Cabbage).

## 2 Experimental Sections

### 2.1. Collection of Cabbage

Fresh white cabbage of *Brassica oleracea* were purchased from a local market in Tirupattur, dried and converted into a powder using an electric blender. The dried powders were used for further analysis.

### 2.2. Methodology of Extraction of Cabbage

Take 5 grams of *Brassica oleracea* (white cabbage) + 50 ml of distilled water and 5 g of *Brassica oleracea* (white cabbage) + 50 ml of methanol was placed in a thimble and extracted for 8 cycles in a Soxhlet apparatus separately. After 8 cycles, extract was filtered by whatman no.1 filter paper.

### 2.3. Phytochemical Analysis

The Aqueous and methanolic *Brassica oleracea* (white

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cabbage) extracts solutions were assessed for the existence of the phytochemical analysis by using the following standard methods [7].

**1. Test for Anthraquinones**

10 ml of benzene was added in 6 g of the Ephedra powder sample in a conical flask and soaked for 10 minutes and then filtered. Further 10 ml of 10% ammonia solution was added to the filtrate and shaken vigorously for 30 seconds and pink, violet, or red color indicated the presence of anthraquinones in the ammonia phase.

**2. Test for Tannins**

10 ml of bromine water was added to the 0.5 g aqueous extract. Decoloration of bromine water showed the presence of tannins.

**3. Test for Saponins**

5.0 ml of distilled water was mixed with aqueous crude plant extract in a test tube and it was mixed vigorously. The frothing was mixed with few drops of olive oil and mixed vigorously and the foam appearance showed the presence of saponins.

**4. Tests for Flavonoids**

2 ml of 2.0% NaOH mixture was mixed with aqueous plant crude extract; concentrated yellow color was produced, which became colorless when we added 2 drops of diluted acid to mixture. This result showed the presence of flavonoids.

**5. Tests for Glycosides**

Added 2 ml $H_2SO_4$ concentrated to the whole aqueous plant crude extract. A reddish brown color formed which indicated the presence of steroidal aglycone part of the glycoside.

**6. Test for Terpenoids**

2.0 ml of chloroform was added with the 5 ml aqueous plant extract and evaporated on the water path and then boiled with 3 ml of $H_2SO_4$ concentrated. A grey color formed which showed the entity of terpenoids.

**7. Test for Steroids**

2 ml of chloroform and concentrated $H_2SO_4$ were added with the 5 ml aqueous plant crude extract. In the lower chloroform layer red color appeared that indicated the presence of steroids [8, 9].

**8. Alkaloids**

The solvent free extract (50mg) was stirred with one ml of dilute hydrochloric acid and filtered. The filtrate was tested for alkaloids. To the filtrate, a drop of Mayer's reagent was added along the sides of the test tube. A white precipitate indicates the test as positive. The Fig.1. Shows the *Brassica oleracea* (White cabbage).

**Fig.1. *Brassica oleracea* (White cabbage) and their powder**

**9. Carbohydrates**

To 0.5ml of the extract of the plant sample, 1ml of water and 5-8 drops of Fehling's solution was added at hot and observed for brick red precipitate.

**10. Detection of Quinones**

About five ml of the extract was boiled with10% HCl for few minutes in a water bath. It was filtered and allowed to cool. Equal volume of Chloroform was added to the filtrate.Few drops of 10% ammonia was added to the mixture and heated. Formation of pink colour indicates the presence of anthraquinones [10].

**2.4. *In vitro* Antioxidant activity of AQWBa and MEWBa**

**2.41. DPPH radical scavenging assay**

This was assayed as described by [11]. The reaction mixture prepared containing 50ml of Methanol. DPPH (Diphenyl-2-picryl hydrazyl radical)- 1mM 3 ml of 1mM DPPH in methanol was added to 100µl of plant extract with concentrations ranging from 20µl, 40µl, 60µl,80µl and 100µl. DPPH solution with methanol was used as a positive control (ascorbic acid) and methanol alone acted as a blank. When DPPH reacts with antioxidant in the sample and the color changed from deep purple to light yellow. This was measured calorimetrically at 518 nm. The percentage for scavenging activity was calculated by the following formula [12]: Scavenging activity (%) = A518 (control)-A518 (sample)/X 100 A518 (control).

**3. Results and Discussion**

**3.1. The Preliminary Phytochemical Analysis of AQWBa and MEWBa**

The results of phytochemical screening of aqueous and methanolic extract of *Brassica oleracea* (White Cabbage) revealed the presence of some secondary metabolites like alkaloids, carbohydrates, flavonoids, steroids, terpenoids, tannins, quinones, phenols and absence the bioactive compounds namely saponins and glycosides. The Table 1 and Fig.2, 3 shows the Preliminary phytochemical analysis of aqueous and methanolic extract of *Brassica oleracea* (White Cabbage) as follows,

Ekta Singh Chauhan [13, 14] reported that the distilled water of qualitative analysis of red cabbage powder showed the presence of various bioactive compounds such as alkaloid, glycosides, steroids, flavonoids, saponin, tannin, terpenoids and phytosterols. When compared to water, petroleum ether, chloroform and methanol extract.

**Table 1: The Preliminary Phytochemical Analysis**

| Phytochemical Constituents | *Brassica oleracea* (White Cabbage) | |
|---|---|---|
| | Aqueous | Methanol |
| Carbohydrates | + | + |
| Alkaloids | + | + |
| Flavonoids | + | + |
| Steroids | + | + |
| Terpenoids | + | + |
| Tannins | + | + |
| Quinones | + | + |
| Phenols | + | + |
| Saponins | - | - |
| Glycosides | - | - |

Indicated as: + means Presence, - means Absence

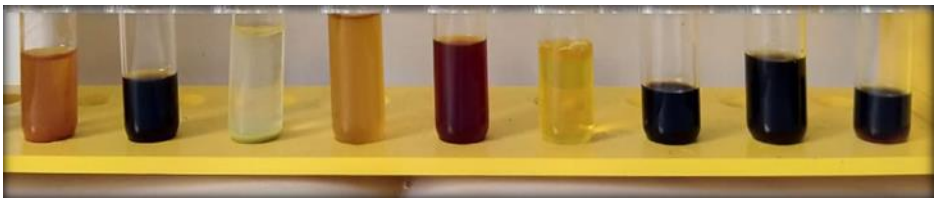

**Fig 2. Preliminary phytochemical analysis of AQWBa**

**Fig 3. Preliminary phytochemical analysis of MEWBa**

### 3.2. Antioxidant activity of AQWBa and MEWBa

Antioxidants play a significant role in inhibiting against various diseases. The significant antioxidant properties have been showed that the phytochemicals are necessary for the reduction in the occurrence of numerous diseases [15]. The results of DPPH radical scavenging activity showed the $IC_{50}$ ranges of methanolic extract of *Brassica oleracea* (White Cabbage) were found to be 40.23µg when compared to control ascorbic acid 43.51µg and aqueous extract 48.20µg. The Fig.4.Shows the antioxidant activity of aqueous (AQWBa) and methanolic (MEWBa) extract of *Brassica oleracea* (White Cabbage) as below,

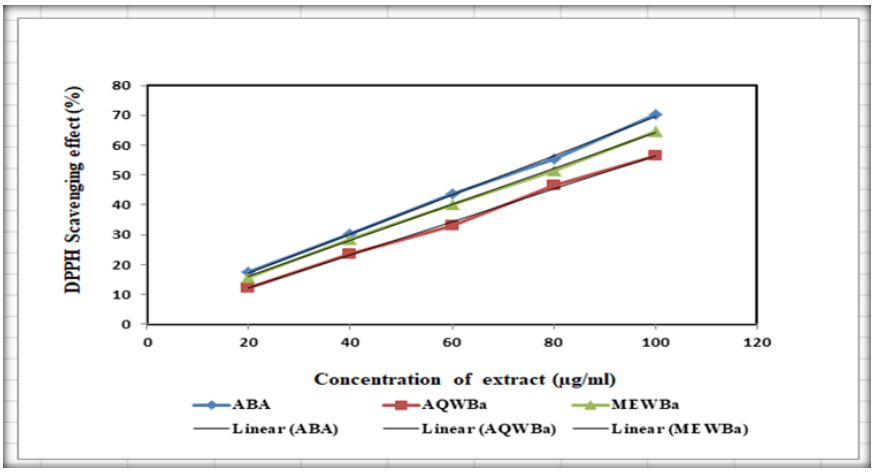


**Fig 4. The antioxidant activity of AQWBa and MEWBa**

Karadeniz [16] showed that the increased antioxidant activity of red cabbage followed by onion and standard ascorbic acid were respectively. The ethanolic extract of white cabbage exhibited a maximum ability to scavenge the radical such DPPH especially when a compared to water and methanolic extracts [17, 18]. The radical scavenging of DPPH results revealed that the water extract of cabbage showed increased radical scavenging activities when

compared to apple, carrot, pear, broccoli and positive control ascorbic acid were respectively [19,20].

## 4. Conclusion

It can be concluded that the phytochemical screening of aqueous and methanolic extract of *Brassica oleracea* (white cabbage) showed that the presence of carbohydrates, alkaloids, flavonoids, steroids, terpenoids, tannins, quinones and phenols and the absence of saponins and glycosides were respectively. The DPPH radical scavenging activity of methanolic extract of *Brassica oleracea* (white cabbage) revealed that the $IC_{50}$ with minimum concentration and more effective radical scavenging activity when compared to standard and aqueous extract. From the data obtained, it can be concluded that the white cabbage of *Brassica oleracea* can be used as a possible source of treatment for problems associated with oxidative stress as well as strong anticancer activity.

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**Conflict of Interest:** Nil

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