

A Comparative Chemical Analysis of Phytochemicals Content of Green Cabbage and Red Cabbage

Nida Tanveer, Gulrez Nizami, Mohammad Azam, Mohammad Arshad, Sheela, Farman Ali, Shifa Rehman Merajuddin

Department of chemistry, Sir Syed Faculty of Science,
Mohammad Ali Jauhar University Rampur (U.P), India

Abstract: Cabbage is very grandly essential vegetables in the whole world. It becomes into the Brassicaceae family. In this investigation of phytochemical, comparative study of red cabbage and green cabbage were carried out. Some phytochemical were present in both red cabbage and green cabbage while some phytochemical were absent. The phytochemical analysis of red cabbage powder extracts indicated with exist certain phytochemical compound. Some phytochemical in powder extracts such as saponin, tannin, flavonoids, glycosides, and alkaloid were present in a large amount and phytosterols found in only methanol extract. In the analysis of red cabbage juice tannin, phytosterols, flavonoids, and alkaloid were present in each extract of red cabbage juice but the glycoside was present in methanol extract and saponin was found in methanol extract and water extract. The phytochemical detection of green cabbage powder and juice extracts confirmed that the phytochemical is found in a small amount. The phytochemical analysis of green cabbage and red cabbage powder or juice founded that the Phytochemicals were present a small amount in green cabbage as compared with red cabbage. The phytochemical analysis of green cabbage juice and water revealed that the phytochemicals were present in a small amount as compared with red cabbage.

Keywords: Alkaloid, Glycosides, Saponin, Tannins, Phytosterols, and Flavonoids

I. INTRODUCTION

Cabbage is a major family of Brassicaceae is the essential vegetable which developed all around the world. Cabbage has antioxidant, anti-inflammatory and anti-bacterial properties because of all these properties; it is used in the conventional medicines [Sami Rokayya et al., 2013]. Eventual determination on phytochemicals is continuing to recognize that a small number of the cabbage compounds influence the health and have anti-infection properties. [Dinkova-kostova AT. et al., 2012]. Distinctive researches on phytochemicals are with red leaves or purple in color, red cabbage is a herbaceous biennial, dicotyledonous inflorescence plant [Maha A. et al., 2012]. Green leafy vegetable rises under moderate tropical weather season [Singh et al., 2010]. The cabbages are grown under special cold, moist climate conditions [Thompson, 2002]. Phytochemicals are known as secondary metabolites because by which the plants the phytochemicals are produced only have small requirements for them. Phytochemicals measure in all part of a plant may mark from one part to another part [P.Tiwari. et al., 2011]. Natural food is the chief source for the biologically active drugs [Saleh et al., 2009]. Phytochemicals have been a progressively more delight in the confirmation of medicinal plants as natural products in varied parts of the world [Gazzaneo et al., 2005]. Phenolic compounds are a huge group of phytochemicals prevalent in the plant realm [Maria Elena Cartea*. et al., 2011]. The alkaloid has a nitrogen group and lower molecular weight in the presence of a heterocyclic ring is known as mostly alkaline [Yang et al., 2010]. The plant's

alkaloids are used from separated group to change common known eventual after primitive period due to the ability of these molecules to proofread the human central nervous system [Croteau et al., 2000]. Plants have an excessive ability to manufacture the different bioactive compounds [Suffredini I.B et al., 2004]. Glycosides instant a sugar group is known as the glycone and aglycone or genin part is known as the non-sugar group [Marco BA 2007]. Vitamin C is also found in green cabbage and red cabbage in a large amount and containing different nutrients and phytochemicals [Arts, I.C. et al., 2005]. They are used in different diseases such as diabetes, cancer, cardiovascular, Alzheimer's, arthritis, and paralysis other health issues associated with functional deterioration [Nawriska-Olszanska A et al., 2000]. Plants are composite flavonoids and its responsibilities to microbial infection. Flavonoids are known as hydroxylated phenolic substances. [R. A. Dixon, et al., 1983]. The extracts were established to contain different secondary metabolites such as tannins, flavonoids, glycosides, alkaloids, saponin, and phytosterols. The secondary metabolite glucosinolate is the typical compound of the crucifer family [Steven F. et al., 2003].

II. MATERIAL AND METHOD

1. Plant Material

Red cabbage and green cabbage leaves were desiccated into hot air oven dried up at 10-degree centigrade then texture to a well made powder and reserved in an airtight container. For accumulation, red cabbage and green cabbage juice leaves were grated in the mixture. After

adding half a cup of water in the cabbage mixed the pieces in the grinder and take out the juice.



Fig. 1 Brassica Oleracea var. Capitata f. rubra powder form



Fig. 2 Brassica Oleracea var. Capitata powder form

2. Extraction Qualitative Analysis For Phytochemical

Red cabbage and green cabbage powder and juice were separated with petroleum ether, chloroform, methanol and water at the ratio 30:70. The extracts of red cabbage and green cabbage powder and juice were congestive ones at a time by the use of filter paper. All the extract of both cabbages were crashed and the rank of solvents was dispersed on the underside vacuum. The extracts were evaporated under the water bath the liquid to a gas assimilate heat and condensing. It out back to a liquid.

3. Fundamental Dissection of Phytochemical

Phytochemicals are a bioactive part, originated from the plants and widely used in the typically herbal drugs. These herbal drugs are used by the community to treat the different diseases like as, cancer, diabetes mellitus HIV etc. The medicinal plants' red cabbage and green cabbage extracts were further used for chemical tests for existing different phytochemicals like as phenolic compound, alkaloids, saponin, glycosides, phytosterols, tannin, flavonoids, using the ways described as follows.

A). Test for Alkaloids

Alkaloids are naturally developing chemical components that usually containing a nitrogen atom as a basic unit.

1. Mayer's test

Mayer's reagent was prepared by 1.36 gm Mercuric Chloride and 5.00 gm Potassium iodide added in 100 ml distilled water. To a small amount of each extract taken in dilute HCl and then added a drop of Mayer's reagent through the side test tube. A white or creamy precipitate was obtained and white or creamy precipitate intimated the test is positive.

2. Wagner's test

Wagner's reagent was prepared by 2gm iodine and 6gm Potassium Iodide added in 100ml distilled water. To a few ml of filtrate and few drops of Wagner's reagent were mixed in a test tube. The established a reddish-brown precipitate, verified that test is positive.

B). Test for Glycosides

1. Brontrager's test

To 2 ml of extract, 2 ml dilute Sulphuric acid was added boil for 5 minutes and separated to the filtrate same volume of chloroform was mixed and stir well organic layer was isolated and 10 % ammonia solution was added to it pinkish red color intimated exist glycosides.

2). Test for Tannins

Tannin is a component of naturally occurring polyphenol, it found in plants, seeds, bark, wood, leaves, and fruit skins. To 1-2 ml of plant extract, a few drops of 5% FeCl₃ mixture were added. A green color intimated exists of gallotannins which brown color intimated tannins.

3). Test for flavonoids

Flavonoids are a group of phytochemicals it belongs to a subclass of polyphenols that are the very potentate and generous antioxidant in our diet.

SHINODA Test

To 0.5 ml of each extract was taken in a test tube and 5-10 drops of dilute HCl was mixed after those adding small pieces of magnesium.

1). Test for Saponins

5 ml of an aqueous extract was taken in a test tube and a few drops of sodium bicarbonate were added. The solution was shaking up quickly and left 3 minutes Honeycomb like forth were found it proved that the saponin is present.

2). Test for Phytosterols

A certain amount of each extract was mixed severally in 5ml of water.

Salkowski's Test

Some drops of conc. Sulphuric acid was added in the solution and the form of red color proved that the phytosterols are present and the test is positive.

III. RESULT AND DISCUSSION

The present study is the comparative analysis between the phytochemicals content of red cabbage and green

cabbage powder and juice. The phytochemicals study of red cabbage and green cabbage powder or juice extracts provided the existence of different secondary metabolites such as alkaloids, glycosides, tannins, flavonoids saponin and phytosterols.

Table 1 List of Phytochemicals in Red Cabbage Powder Extracts

Name Of The Chemical Test	Petroleum Ether Extract	Chloroform Extract	Methanol Extract	Water Extract
Alkaloids	++	-+	--	-+
Glycosides	-	+	+	+
Saponin	+	+	-	+
Tannins	+	+	+	+
Phytosterols	-	-	+	-
Flavonoids	+	-	+	+

The phytochemicals investigation of red cabbage and green cabbage powder showed that the many phytochemical compounds are present in powder extract. Some phytochemical such as alkaloid, flavonoids, saponin, tannin, and phytosterols are present in distilled water extract since in petroleum ether, chloroform, distilled water extract and methanol extract some phytochemicals were absent.

Table.2 List of Phytochemicals in Red Cabbage Juice Extract

Name of the chemical test	Petroleum ether	Chloroform extract	Methanol extract	Water Extract
Alkaloids	++	- +	- +	- +
Glycosides	-	-	+	-
Saponin	-	-	+	+
Tannins	+	+	+	+
Phytosterols	+	+	+	+
Flavonoids	+	+	+	+

The phytochemical analysis of Red cabbage juice showed the existence of various phytochemical compounds in methanol extract. The phytochemicals such as alkaloid, glycosides, flavonoids, saponin, tannin, and phytosterols are present in where in petroleum ether, chloroform, and distilled water extract some phytochemical were absent. In this study of phytochemical screening of green cabbage juice confirmed that the different phytochemical compounds are present in methanol extract, petroleum ether extract, distilled water extract and chloroform extract some phytochemical are absent in each extract. An alkaloid is present in petroleum ether extract and water extract in chloroform extract and methanol extract it was absent. Glycosides are present in chloroform extract and methanol extract these are absent in petroleum ether extract and water extract. Saponin is present in chloroform extract and water extract where is absent in methanol extract and petroleum ether extract. Flavonoids are absent in methanol extract, distilled water, and petroleum ether extract where is present in chloroform extract.

Table no.3 List of Phytochemical in Green Cabbage Juice Extract

Name of the chemical test	Petroleum ether extract	Chloroform extract	Methanol extract	Water Extract
Alkaloids	- +	-	-	++
Glycosides	-	+	+	-
Saponin	-	+	-	+
Tannins	+	-	+	+
Phytosterols	+	-	-	-
Flavonoids	-	+	-	-

Thus the study revealed that a number of positive effects of red cabbage such as phytochemicals were found which is beneficial for the health. Red Cabbage powder and juice have the more phytochemicals are present compared with Green Cabbage. Red Cabbage is contained many bioactive substances. The phytochemical such as alkaloids, glycosides, tannins, saponin, phytosterols, and flavonoids were present which increased the medicinal potential of red cabbage and thus be used for the treatment of cancer, diabetes, CVS, and HIV etc

Table no.4 List of Phytochemicals in Green Cabbage Powder Extract

Name of the chemical test	Petroleum ether extract	Chloroform extract	Methanol extract	Water Extract
Alkaloids	-	- +	-	- +
Glycosides	+	-	+	+
Saponin	+	+	-	-
Tannins	-	-	+	+
Phytosterols	-	+	-	-
Flavonoids	+	+	-	-

IV. CONCLUSION

Medicinal Plants (Red and green cabbage) were used for the treatment of a variety of disease. Thus, the present study exposed that a number of positive effects of Red cabbage as well as green cabbage such as phytochemicals were found which are very important for the health. The phytochemical such as alkaloids, glycosides, flavonoids, saponin, tannin, and phytosterols were present in these plants, increase the medicinal potential of Red cabbage and green cabbage thus can be used for the treatment of various diseases such as Cancer, diabetes, Cardiovascular, Alzheimer's, and Arthritis etc. The sample of Brassica oleracea var. Capitata f. Rubra exhibits a set of diagnostic characters, which helps to find the drug in the dried condition. Macroscopic and Microscopic characters of the plant are used for the identification of the drug. Red Cabbage extract has also prevented oxidative stresses induced in livers and brains of animals exposed to paraquate.

Reference

[1]. Arts IC, Hollma PC. Polyphenols and disease risk in epidemiologic studies. American Journal of Clinical Nutrition, 2005;

[2]. Croteau R, Kutchan TM, Lewis NG. Natural Products (Secondary metabolites). In: Buchanan B, Grissem W, Jones R, editors. Biochemistry and molecular biology of plants. Rockville: American Society of Plant Physiologists; 2000;

[3]. Dinkova-Kostova AT, Kostov RV (2012). "Glucosinolates and isothiocyanates in health and disease". Trends Mol Med. 18 (6): 337-

47. doi:10.1016/j.mol med.2012.04.003.PMID 22578879

[4]. Gazzaneo Ir, De Lucena PRF, Paulino de Albu Qu, In vitro antioxidant activities of Ocimum species: Ocimum basilicum and Ocimum sanctum, J. Ethnobiol. Ethnomed, 2005

[5]. Maha A. El-Motaleb el-Mowafy. Treatment Effect of red cabbage and Cysteine against paracetamol-induced Hepatotoxicity in Experimental Rats, Journal of Applied Sciences Research, 2012;

[6]. Marco BA, In Synthesis and characterization of glycosides. Springer 2007

[7]. Maria Elena Cartea *, Marta Francisco, Pilar Soengas and Pablo Velasco, Phenolic Compounds in Brassica Vegetables, journal molecules, 2011

[8]. Nawirska-Olszanska A, Kita A, Biesiada A, Sokol-Letowska A, Kucharka A.Z, Characteristics of antioxidant activity and composition of pumpkin seed oils in 12 cultivars, Food Chemistry, 2013

[9]. P. Tiwari, B. Kumar, M. Kaur, G. Kaur, H. Kaur, Int. pharm. Science 2011:

[10]. R. A. Dixon, P. M. Dey, and C. J. Lamp, "Phytoalexins: enzymology and molecular biology," Advance in Enzymology and Related Areas of Molecular Biology, vol. 55, 1983

[11]. Saleh Al, AL-Dosari M, Abdul MS, Alsheikh M, Abdul-Kader MS, Evaluation of the Hepatoprotective effect of Fumaria parviflora and Momordicabalasmina from Saudi Folk Medicine against Experimentally Induced Liver Injury Res. J. Med. Plants, 2009

[12]. Sami Rokayya, Chun-Juan Li, Yan Zhao, Ying Li, Chang-Hao Sun*, Cabbage (Brassica oleracea L.Var. Capitata) Phytochemicals with Antioxidant and Anti-inflammatory potential, Asian Pacific journal of cancer prevention, vol 14, 2013 6657-6662

[13]. Singh, B.K., Sharma, S.R., Kalia, P. and Singh, B., 2010, Character association and path analysis of morphology and economic traits in cabbage (Brassica oleracea var. Capitata L.), Indian Journal of Agricultural Sciences. 80 (2): 116-118.

[14]. Steven F. Vaughn, Mark A. Berhow, Glucosinolate hydrolysis product from various plant sources: pH effect, isolation, and purification-New Crops and Processing Technology Research, National Centre for Agriculture Utilization Research, Industrial crops and product journal Received 22 December 2003; accepted 25 March 2004

[15]. Suffredini, I.B.; Sader, H.S.; Goncalves, A.G.; Reis, A.O.; Gales, A.C.; Varella, A.D.; Younes, R.N. Screening of Antibacterial extracts from plants native to the Brazilian Amazon rain, forest, and Atlantic forest. Braz. J. Med. Biol. Res. 2004

[16]. Thompson J. K., 2002. Yield evaluation of cabbage varieties. J. Agric. Technol., 5:15-19.

[17]. Yang L, Stockigt J. Trends for diverse production strategies of plant medicinal alkaloids. Nat prop Rep. 2010.