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PRELIMINARY PHYTOCHEMICAL AND XRD ANALYSIS OF CAULIFLOWER (*BRASSICA OLERACEAE VAR BOTRYTIS* L.)

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ABSTRACT

The aim of the present study to investigate the phytochemicals compound present in *Brassica oleraceae* extracts using petroleum ether, chloroform and ethanol as solvents. The fine particles were characterized by XRD for structural determination and estimation of crystallite size. The phytochemicals screening of *B. oleracea* extracts were carried out to determine the compounds using the colour test adapting standard methods. *B. oleraceae* extract showed the presence of alkaloids, flavanoids, steroids, protein, anthroquinone, phenols, quinone and carbohydrate. The present study revealed that a phytochemical constituent present of *B. oleraceae* was used for the treatment of various diseases.

INTRODUCTION:

Cruciferous vegetables are one of the prevailing food crops worldwide. *Brassica* vegetables are greatly regarded for their nutritional value they are rich source of vitamin C, soluble fiber as well as contain multiple nutrients and phytochemicals [1]. Recent studies revealed that cruciferous are the good source of natural antioxidants because they contain carotenoids, tocopherols and ascorbic acid [2].

Drugs from the plants are easily available, less expensive, safe and efficient and rarely have side effects. The plants which have been selected for medicinal use over thousands of years constitute the most obvious choice for examining the current search for therapeutically effective new drugs such as anticancer drugs [3].

The present study was undertaken to investigate the phytochemical and XRD analysis of *B. oleracea* using various extracts.

MATERIAL AND METHODS

Collection and identification of plant material

B. oleracea were collected in and around markets of Coimbatore. The authenticity of the plant was confirmed in Botanical Survey of India, Tamil Nadu Agricultural University, Coimbatore. The *B. oleracea* were washed with water to remove the dirt and shade dried. The shade dried samples were powdered and was stored in screw cap bottles until further analysis.

Preparation of extract

10 g each of *B. oleracea* powder was weighed using an electronic balance (Denver XS-210) and made into packets

using zerohaze filter paper (A Grade, SD's). These powders were subjected to extraction with 500 ml of the solvents for 8 h using a Soxhlet apparatus [4, 5]. Petroleum ether (60-80^{0}C) extraction was followed by chloroform extraction and ethanol extraction so that the powders were subjected to extraction with solvents of increasing polarity Figure 1. The *B. oleracea* extracts thus obtained were concentrated by distillation and dried by evaporation in a water bath at 40^{0}C. The residue thus obtained was stored in tightly closed glass vials in the refrigerator for further use.

Phytochemical screening

The phytochemicals screening of *B. oleracea* extracts were carried out to determine the compounds namely alkaloids, phenols, flavonoids, terpenoids, steroids, anthraquinones, proteins, quinines and carbohydrate using the colour test adapting standard methods [6].

XRD analysis Particle characterization

The X- ray diffraction (XRD) patterns of the samples were recorded on a PANalyticalX'Pert PRO X-ray diffractometer using Cu jKα radiation (λ = 0.15406 Å). The crystallite size of nanocrystalline samples was measured from the line broadening analyses using Debey Schherer formula after accounting for instrumental broadening.

RESULT AND DISCUSSION

This study revealed the presence of phytochemicals considered as active medicinal chemical constituents. *B. oleracea* contains several phytochemicals which are beneficial to human health. These are the source of the secondary metabolites showed as alkaloids, flavanoids, steroids, terpenoids, anthroquinone, protein, phenols, quinone and carbohydrate. The result obtained in the phytochemical analysis of petroleum ether extracts showed the presence of alkaloids, flavanoids, anthroquinone, phenols and carbohydrate. In chloroform extract, alkaloids, flavanoids, steroids, protein, phenols, quinone and carbohydrates were present. Alkaloids, flavanoids, steroids, protein, phenols and quinone were present in ethanol extract Table 1. Similar results were recorded by alkaloids, flavanoids, protein, steroids, phenols, carbohydrates [7] and quinone were presented in *B. oleracea* leaf extracts and similar results were recorded in Aloe Vera [8]. The medicinal plants are useful for healing as well as for curing of human diseases because of the presence of phytochemical constituents [3]. Terpenoid exhibit various important pharmacological activities of anti-inflammatory, anticancer, anti-malarial, inhibition of cholesterol synthesis, anti-viral and anti-bacterial activities [9]. Terpenoids are very important in attracting useful mites and consume the herbivorous insects [10]. Alkaoids are used as anaesthetic agent and are found in medicinal plants [11]. These phytochemicals have been linked to many positive effects on human health, including coronary heart diseases, diabetes, high blood pressure, cataracts, degenerative diseases and obesity [12, 13]. XRD can be used to characterize the crystallinity of nanoparticles and it gives the average diameters of all the nanoparticles. The fine particles were characterized by XRD for structural determination and estimation of crystallite size. All experimental peaks were matched with theoretically generatedone and indexed. The XRD patterns of all the samples were shown in Figure 2 and Table 2. X-ray diffraction analysis is used for determining the chemical composition and crystal structure of a material. Detecting the presence of particles in plants tissues can be achieved by using XRD to examine the diffraction peaks of the plant. The crystalline nature of particles was further ion confirmed from X-ray diffraction analysis shows the XRD pattern of the dried particles obtained from colloid samples. Two peaks were observed in cauliflower at 21.47^0 and 31.05^0. These Braggs reflections clearly indicated that presence of (125.21) and (67.38) sets of lattice planes and further.

Table 1: Phytochemical constituents of *B. oleracea*

S.NO.	TEST		Pet. ether	Chloroform	Ethanol
1	Alkaloids	Mayers	-	-	+
		Wagners	+	+	-
		Hagers	+	+	+
2	Flavanoids	Sod.Hydroxide test	-	-	+
		Sulphuric acid test	+	+	+
3	Steroids	Libermann-Burchard	-	+	+
4	Terpenoids	Libermann-Burchard	-	-	-
5	Anthraquinone	Borntragers	+	-	-
6	Protein	Ninhydrin (Aq)	-	-	+
		Ninhydrin (Acetone)	-	-	+
		Biuret	-	+	+
7	Phenols	Ferric Chloride	+	-	+
		Libermann	-	+	-
8	Quinone	Conc HCl test	-	+	+
9	Carbohydrate	Molish	-	+	-
		Fehlings A &B	+	+	-

+ Detected - Not detected

Fig-1: *Brassica oleracea* L.

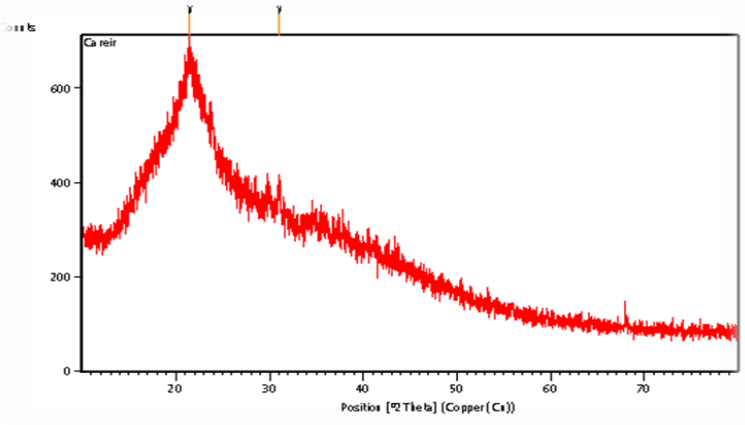

Fig-2: XRD pattern of cauliflower

Table 2 Peak list of cauliflower

Pos. [°2Th.]	Height [cts]	Fwhmleft [°2Th.]	d-spacing [Å]	Rel. Int. [%]
21.4720	125.21	0.5353	4.13851	100.00
31.0589	67.38	0.2007	2.87949	53.82

CONCLUSION:

The present study revealed that phytochemical present in *B. oleraceae* which is beneficial for the human health. The phytochemicals such as alkaloids, flavanoids, steroids, terpenoids, anthroquinone, protein, phenols, quinone and carbohydrate were present which increases the medicinal potential of *B. oleraceae* and thus can be used for the treatment of various diseases.

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