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PHYTOCHEMICAL SCREENING AND XRD ANALYSIS OF *MOMORDICA CHARANTIA*

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ABSTRACT

The aim of the study was to investigate the X-ray diffraction pattern analysis and phytochemical compounds present in fruit part of *Momordica charantia* extract with petroleum ether, ethanol and chloroform as solvents. The phytochemical screening of plant extracts revealed the presence of steroids, terpenoids, alkaloids, flavonoids, anthraquinone, quinine, phenolic compounds, carbohydrates and proteins. These phytochemicals have potent antifungal efficiency against selected infectious micro-organisms.

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INTRODUCTION

Plants constitute a source of novel chemical compounds which are of potential use in medicine and other applications. Plants contain many active compounds such as alkaloids, steroids, tannins, glycosides, volatile oils, fixed oils, resins, phenols and flavonoids which are deposited in their specific parts such as leaves, flowers, bark, seeds, fruits, roots, etc. Bitter Melon was traditionally used for a dazzling array of conditions by people in tropical regions. Numerous infections, cancer, leukemia, and diabetes are among the most common conditions it was believed to improve. The fruits and leaves of this plant contain two alkoloids, one of them being momordicine. The plant is reported to contain a glucoside, a saponin-like substance, a resin with an unpleasant taste, an aromatic volatile oil and a mucilage. Phytochemicals are known to possess antioxidant (Wong *et al.,* 2009), antibacterial (Nair *et al.,* 2005), antifungal (Khan and Wassilew, 1987), antidiabetic (Singh and Gupta, 2007; Kumar *et al.,* 2008a), antiinflammatory (Kumar *et al.,* 2008b), and radioprotective activity (Jagetia *et al.,* 2005) and due to these properties they are largely used for medicinal purpose.

The main purpose of the present study was collection and identification of plant materials and screening for presence of various phytochemicals in these medicinal plants. Herbs and spices are very important and useful as therapeutic agent against many pathological infections (Gull *et al.,* 2012).

MATERIALS AND METHODS

Collection and preparation of extracts: The medicinal plant *Momordica charantia* was collected from surrounding areas of Coimbatore district. Fruit part of *Momordica charantia* of medicinal plant were separated, washed with distilled water, shade dried. They were ground in to powder and stored in room temperature.

Preliminary phytochemical screening: The different qualitative chemical tests were performed for establishing the profile of given extracts to detect various phytoconstituents present in them.

Qualitative analysis: The different qualitative chemical tests were performed for establishing the profile of given extracts to detect various phytoconstituents present in them. Preliminary

screening of the extracts and identification was done by colour tests adapting standard methods by Raman (2006).

Particle characterization: The X- ray diffraction (XRD) patterns of the samples were recorded on a PANalytical X'Pert PRO X-ray diffractometer using Cu Kα 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 (Equation 1):

$$D_{XRD} = 0.89 \lambda / \beta \cos \theta \quad \text{.....(1)}$$

Where λ – wavelength of X-ray radiation used in Å, θ is the diffraction angle, β is the full width at half maximum (FWHM) in radians in the 2θ scale, D XRD is the crystallite size in nm.21.

extracts but absent in petroleum ether extract. Alkaloids are one of the diverse groups of secondary metabolites found to have antimicrobial activity by inhibiting DNA topoisomerase. Carbohydrate which constitutes the major edible part of the plant is present in all the above three medicinal plant extracts. A considerable amount of anthraquinone, phenol and carbohydrate were present in all three extracts and terpenoids were present in ethanol extract of *M.charantia*.

Protein were present in petroleum ether and chloroform extract. 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. XRD pattern were analyzed and all experimental peaks were matched with theoretically generated one and indexed (Fig. 1).

Table 1. Phytochemical constituents of *Momordica charantia*

S.No		Tests	Petroleum Ether	Ethanol	Chloro-form
1	Alkaloids	i) Mayers	-	-	+
		ii) Wagners	-	+	+
		iii) Hagers	+	-	+
2	Flavanoids	i) Sod.Hydroxide test	-	-	-
		ii) Sulphuric acid test	-	+	+
3	Steroids	i) Libermann-Burchard	+	-	-
4	Terpenoids	i) Libermann-Burchard	-	+	-
5	Anthraquinone	i) Borntragers	+	+	+
6	Protein	i) Ninhydrin (Aq)	-	-	+
		ii) Ninhydrin (Acetone)	-	-	+
		iii) Biuret	+	-	-
7	Phenols	i) Ferric Chloride	-	+	-
		ii) Libermann	+	-	+
8	Quinone	i) Conc HCl test	-	-	-
9	Carbohydrate	i) Molish	+	+	-
		ii) Fehlings A &B	-	+	+

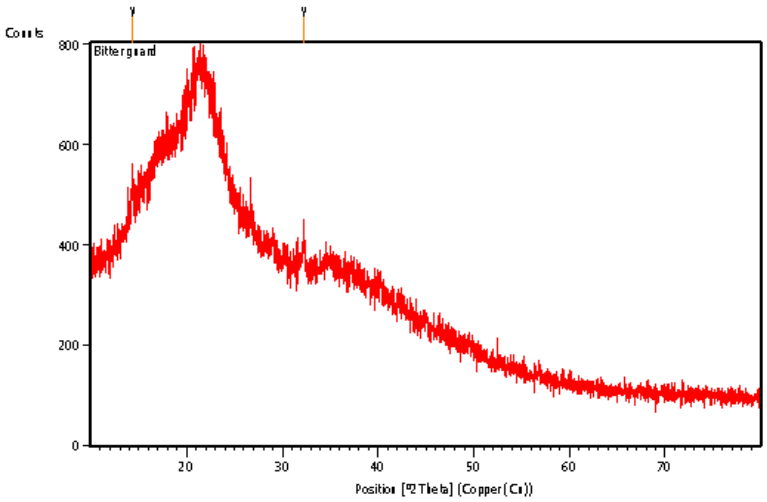

Figure 1. XRD Analysis of *M. charantia*

Table.2 XRD Analysis of *M. charantia*

Pos.[°2Th.] d-	Height [cts]	FWHMLe ft[°2Th.]	spac[Å]	Ret.Int. [%]
14.3644	81.68	0.2676	6.16628	100.00
32.2697	67.87	0.2007	2.77417	83.09

RESULTS

The phytochemical analysis of petroleum ether, ethanol and chloroform and extracts of *M.charantia,* revealed the presence of phytochemicals in varying proportions (Table1). The presence of alkaloid has seen in chloroform and ethanolic

DISCUSSIONS

Secondary metabolite studies of above medicinal plant have shown that the presence of carbohydrates, alkaloid, quinine, phenol, protein, terpenoids which are of great importance in the field of drug research.

These classes' alkaloids, are known to have activity against pathogens and therefore aid the antimicrobial activities of medicinal plants (Ghosh *et al.,* 2010). In any research in phytotherapy, it is necessary to choose solvent according to biological activity required and not that which gives a high amount of bioactive compounds.

Conclusion

From the present study it is found that crude extract express good biological capacity which indicates that the substance with powerful biological effect exists in this extract and must be isolated and purified to confirm its pharmacological and medical use.

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