International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: SJIF: 5.995
Available Online at www.journalijcar.org
Volume 6; Issue 7; July 2017; Page No. 4992-4994
DOI: http://dx.doi.org/10.24327/ijcar.2017.4994.0629

Research Article

PHYTOCHEMICAL SCREENING AND XRD ANALYSIS OF BLACK PEPPER *PIPER NIGRUM*

Mariselvi S and Manimegalai K

Avinashilingam Institute of Home Science and Higher Education for women, Coimbatore

A R T I C L E I N F O

Article History:

Received 17th April, 2017
Received in revised form 10th May, 2017 Accepted 25th June, 2017
Published online 28th July, 2017

Key words:

Phytochemicals, XRD, *P.nigrum.*

A B S T R A C T

The aim of the study was to investigate the phytochemical compounds present in fruit part of *Piper nigrum* 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.

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. The beneficial medicinal effects of plant materials typically result from the combination of these secondary products (Tonthubthimthong *et al.,* 2001). 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 *Piper nigrum* was collected from surrounding areas of Coimbatore district. Fruit part of *P.nigrum* of medicinal plant were separated, washed with distilled water, shade dried. They were ground in to powder and stored in room temperature.

Corresponding author:* **Mariselvi S
Avinashilingam Institute of Home Science and Higher Education for women, Coimbatore

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). Tests for alkaloids, flavonoids, steroids, terpenoids, anthraquinones, proteins and carbohydrates were carried out.

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 ´). The crystallite size of nanocrystalline samples was measured from the line broadening analyses using Debey- Schherer formula after accounting for instrumental broadening (Equation 1):

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

Where λ – wavelength of X-ray radiation used in ´, 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.

RESULTS

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

seen in chloroform and ethanolic 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 flavanoids, anthraquinone, protein and phenol were present in all three extracts and steroids were present in ethanol and petroleum ether. The compound which possess large amount of flavonoids has found to have inherent ability to modify the body reactions to allergens, viruses and carcinogens.

XRD pattern were analyzed and all experimental peaks were matched with theoretically generated one and indexed (Fig. 1).

DISCUSSIONS

Secondary metabolite studies of above medicinal plant have shown that the presence of carbohydrates, flavonoids, alkaloid, quinine, phenol, protein, terpenoids which are of great importance in the field of drug research. These classes' alkaloids, flavonoids are known to have activity against pathogens and therefore aid the antimicrobial activities of

Table 1 Phytochemical constituents of Piper nigrum

S.No	Qualitative Tests		Petroleum Ether	Ethanol	Chloroform
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	-	-	+

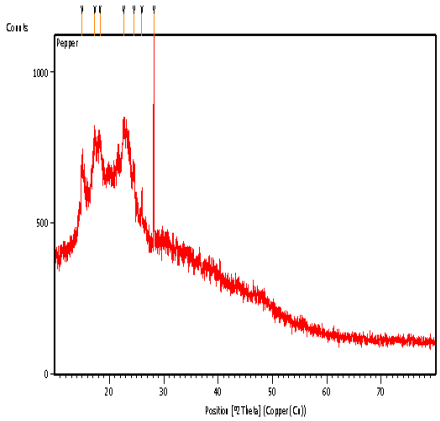

Figure 1 XRD Analysis of *Piper nigrum*

Table 2 XRD Analysis of *Piper nigrum*

Pos.[°2Th.] d-	Height [cts]	FWHMLeft[°2Th.]	spac[Å]	Ret.Int. [%]
14.9906	219.92	0.2676	5.91005	53.24
17.3196	209.66	0.4684	5.12021	50.76
18.2742	163.11	0.4015	4.85484	39.49
22.6332	188.73	0.6691	3.92874	45.69
24.5391	141.09	0.2007	3.62775	34.16
26.0016	94.96	0.2007	3.42692	22.99
28.2043	413.08	0.1004	3.16410	100.00

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.

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. The higher concentrations of more bioactive flavonoids compounds were detected with 70% ethanol due to its higher polarity than pure ethanol (Chantal *et al.*, 2005).

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.

References

1. Ghosh P, Mandal A, Chakraborty P, Rasul MG, Chakraborty M and SahaA (2010) Triterpenoids from Psidium guava with Biocidal Activity. *Indian Journal of Pharmaceutical Science*, 72 (4): 504-507.
2. Gull I, M. Saeed, H. Shaukat, S.M. Aslam, Z.Q. Samra, and A.M. Athar. 2012. Inhibitory effect of Allium sativum and Zingiber officinale extracts on clinically important drug resistant pathogenic bacteria. *Ann Clin Microbiol Antimicrob.*11: 8. doi: 10.1186/1476-0711-11-8
3. Jagetia G.C., Baliga, M.S., Venkatesh,P., (2005) Influence of seed extracts of S. cumini on mice

exposed to different doses of γ radiation. *Journal of Radiation Research.* 46 (1): 59-65.
4. Khan M, Wassilew SW (1987) Natural pesticides from the neem tree and other tropical plants. (Eds) Schmutterer H and Asher KRS, Germany: Digitalverlag GmbH, 645-650.
5. Kumar A, Ilavarasan R, Jayachandran T, Deecaraman M, Aravindan P, Padmanabhan N, Krishan MRV (2008a) Anti diabetic activity of Syzygium cumini seed and its isolate compounds against streptozotocin induced diabetic rats. *Journal of Medicinal Plants Research*, 2(9): 246-249.
6. Kumar A, Ilavarasan R, Jayachandran T, Deecaraman M, Kumar MR, Aravindan P, Padmanabhan N, KrishanMRV(2008b) Anti inflammatory activity of Syzigium cumini seed. *African Journal of Biotechnology*, 7 (8): 941-943.
7. Nair R, KalariyaT, SumitraC, (2005). Antibacterial activity of some selected Indian medicinal flora.. *Turkey Journal of Biology*, 29: 41-47
8. Singh N and Gupta M (2007) Effect of ethanolic extract of Syzygium cumini seed powder on pancreatic islets of alloxen diabetic rats. *Indian Journal of Experimental Biology*, 45: 861-867.
9. Tonthubthimthong P, Chuaprasert S, Douglas P, Luewisuttichat W (2001) Supercritical CO2 extraction of nimbin from neem seeds an experimental study. *Journal of Food Engineering*. 47: 289-293.
10. Wong SK, LimYY, Chan EWC (2009) Antioxidant properties of Hibiscus species variation, altitudinal change costal influence and floral colour change. *Journal of Tropical Forest Science*, 21: 307-315.

How to cite this article:

Mariselvi S and Manimegalai K (2017) 'Phytochemical Screening and Xrd Analysis of Black Pepper Piper Nigrum ', *International Journal of Current Advanced Research*, 06(07), pp. 4992-4994.
DOI: http://dx.doi.org/10.24327/ijcar.2017.4994.0629

****