VOLUME 10 ISSUE 1 2019

e ISSN 2350-0204

ijapc

www.ijapc.com

Greentree Group
Publishers

Int J Ayu Pharm Chem

RESEARCH ARTICLE

www.ijapc.com

e-ISSN 2350-0204

Phytochemical and FT-IR spectral analysis of *Vigna mungo* (L.) Hepper and *Macrotyloma uniflorum* (Lam.) Verdc

Jaya J S[1] and Lohi Das J[2]*

[1,2]Department of Botany and Research Center, Scott Christian College (Autonomous), Affiliated to Manonmaniam Sundaranar University, Abishekapatti, Tirunelveli, Tamil Nadu, India

ABSTRACT

Legumes are considered as the prime source of proteins with desirable nutritional qualities. The qualitative phytochemical and FT-IR spectrum analysis of two different legume cultivators of *Vigna mungo* and *Macrotyloma uniflorum* were collected from Kanyakumari district, Tamilnadu. Qualitative phytochemical analysis shows the presence of various phytochemicals like protein, tannins, steroids, alkaloids, phenols, glycosides, saponins and carbohydrates. FTIR peaks showed the presence of alkenes, carboxylic acids and alkanes. Further, mechanistic studies on pharmacological evaluation are needed for development of active compounds from these legumes for the therapy and treatments.

KEYWORDS

FTIR spectrum, phytochemical analysis, qualitative phytochemical screening, Macrotyloma uniflorum, Vigna mungo

Greentree Group Publishers

Received 08/09/18 Accepted 20/11/18 Published 10/01/19

INTRODUCTION

Legumes are edible seeds which are important source for human nutrition. They are cultivated for grains, fodder for livestock and as green manure[1]. The seeds of *Vigna mungo* contains carbohydrate, fat, protein, fibre and flavonoids[2]. They are also used for manufacturing pharmaceutical products[3]. The seeds of *Macrotyloma uniflorum* have various bioactive compounds, which possess significant and physiological effects on humans[4].

Phytochemical analysis mainly helps to standardize of herbal drugs. Pharmacological analysis of pulse extracts have immuno-stimulatory activity[5]. Legumes produce primary and secondary metabolites such as polyphenols which exhibits various pharmacological effects[6]. A variety of spectroscopic techniques are used to characterize the bioactive compounds in legumes. FT-IR technique is the basic tool to characterize the functional groups of the various bioactive compounds present in the legumes. The present study was to determine the phytochemicals present in *V. mungo* and *M. uniflorum* and their functional groups by using FT-IR spectral analysis.

MATERIALS AND METHODS

Description of *Vigna mungo*

Vigna mungo[7] is an erect annual herb with trifoliate ovate leaflets. The inflorescence has a long peduncle and bears yellow, small, papilionaceous flowers and produce a cylindrical erect pod.

Description of *Macrotyloma uniflorum*

Macrotyloma uniflorum[7] is a densely growing, climbing slender herbaceous legume with trifoliate leaves, leaflets ovate, rounded at the base, acute or slightly acuminate, terminate leaflet, symmetrical, softly tomentose on both surfaces, yellow flowers, single or in short, sessile or subsessile, 2-4 flowered axillary racemes with linear pods.

Collection of the seeds

The seeds of *V. mungo* and *M. uniflorum* were harvested from the home-gardens of Kanyakumari District. The healthy seeds were dried and grounded with the help of a mixer.

Preparation of extract

The dried seeds are powdered and subjected to extraction by using Soxhlet apppartus using acetone, chloroform, ethanol and distilled water. After extraction each of these solvent extracts was weighed and preserved in room temperature.

Phytochemical Screening

Qualitative phytochemical analysis of the acetone, chloroform, ethanol and aqueous extracts of two legumes were carried out to determine the presence of phytochemicals

which includes carbohydrates, protein, alkaloids, flavonoids, terpenoids, tannins, steroids, phenolic compounds, saponins, and glycosides[8].

RESULTS AND DISCUSSION

Qualitative analysis

The results of phytochemical analysis of two legume seeds are tabulated (Table 1 & 2).

Table 1. Phytochemical analysis of *V. mungo* seed

S. No.	Phytochemical constituents	Acetone	Aqueous	Chloroform	Ethanol
1	Carbohydrate	+	+	-	+
2	Protein	-	+	-	+
3	Alkaloids	-	-	-	-
4	Flavonoids	-	+	+	+
5	Terpenoids	+	+	-	+
6	Tannins	+	-	-	-
7	Steroids	+		+	+
8	Phenols	+	+	-	+
9	Glycosides	+	-	+	+
10	Saponin	-	+	-	-

Table 2 Phytochemical analysis of *M. uniflorum* seed

S. No.	Phytochemical constituents	Acetone	Aqueous	Chloroform	Ethanol
1	Carbohydrate	-	+	+	+
2	Protein	-	+	-	-
3	Alkaloids	-	-	+	+
4	Flavonoids	-	-	-	-
5	Terpenoids	-	-	-	-
6	Tannins	+	+	-	-
7	Steroids	+	+	+	+
8	Phenols	-	+	+	+
9	Glycosides	-	+	+	-
10	Saponin	-	+	-	-

The acetone extrtact of *Vigna mungo* seed possesses carbohydrate, terpenoids, tannins, steroids, phenols and glycosides; aqueous extract contain carbohydrates, protein, flavonoids, terpenoids, phenols and saponin; chloroform extract had flavonoids, steroids and glycosides and ethanol extract showed the presence carbohydrate, protein, flavonoids, terpenoids, steroids, phenols and glycosides were present. In *Macrotyloma uniflorum* seed, acetone extract showed the presence of tannins and steroids; aqueous extract showed the presence of carbohydrates, protein, tannins, steroids, phenols and glycosides; chloroform extract has carbohydrate, alkaloids, steroids, phenols and glycosides; and ethanol extract shows the presence of carbohydrate, alkaloids, steroids and phenols.

Preliminary phytochemical screening mainly focus on the qualitative analysis of

the bioactive compounds from the mixture compounds as they may be used for various pharmaceutical practices[9]. Phytochemicals such as carbohydrate, protein, alkaloids, flavonoids, terpenoids, tannins, steroids, phenols, glycosides and saponins were determined in acetone, aqueous, chloroform and ethanol extracts. The phytochemical analysis of *Vigna mungo* seed extracts presence of protein, carbohydrate, flavonoids, alkaloids, terpenoids, tannins, steroids, glycosides, phenols and saponins. Analysis of phytochemicals in *Macrotyloma uniflorum* seed extracts presence of protein, tannins, carbohydrate, steroids, alkaloids, phenols, glycosides and saponins. The phytochemical screening was achieved by many researchers in legumes[10, 11, 12.]

FT-IR analysis

The FT-IR spectral analysis for the seeds powder of *V. mungo* and *M. uniflorum* have been taken. The wave number (cm^{-1}) of spectrum is plotted against percentage of transmittance. Nineteen peakes were found in the FTIR chromatogram of *Vigna mungo.* Among these, 3 was found in high peaks 992.16, 2850.91 and 2919.44 (Figure 1). Nineteen peakes were found in the FT-IR chromatogram of *Macrotyloma uniflorum* (Figure 2). FT-IR spectra shows the similar values for both the species studied. Alkenes, the peak value of 992.16 ($RCH=CH_2$) and alkanes the peak value of 2850.91 and 2919.44 (RCH_2CH_3) were well represented in both *Vigna mungo* and *Macrotyloma uniflorum* seeds. The functional groups of plants can be used to quantify the phytoconstituents[13,14]. Carbonaro et al.[15] analysed the secondary structure of legumes (*Phaseolus vulgaris* L. and *Lens culinaris* L.) seed flour by using FTIR analysis. They also studied the relationship between digestibility and secondary structure of raw and thermally treated legume proteins by using FT-IR analysis[16].

CONCLUSION

Phytochemical analysis of *V. mungo* and *M. uniflorum* seeds showed the presence of various phytochemicals such as carbohydrate, protein, alkaloids, flavonoids, terpenoids, tannins, steroids, phenols, glycosides and saponins, whereas FT-IR spectrum depicted the occurrence of the functional groups. The identification of phytochemical constituents of this two legumes having therapeutic properties and could be used as nutraceuticals.

REFERENCES

1. Messina, M.J. (1999). Legumes and soybeans: overview of their nutritional profiles and health effects. American Journal of Clinical Nutrition, 70(3), 439-450.

2. Anbuselvi, S., Jeyanthi Rebecca, L., Sathish Kumar, M., & Senthilvelan (2012), GC-MS study of phytochemicals in black gram using two different organic manures. Journal of Chemical and Pharmaceutical Research, 4(2), 1246-1250.

3. Duke, J.A. (1981). '*Vigna unguiculata* (L.) Walp *In:* Okeson, O. N.(ed.). Legumes of world importance'. Plenum Press, New York.

4. Duke, J.A., & Reed, C.F.M. (1981). Uniflorum in handbook of legumes of world economic importance. Phenum Press. USA.

5. Tresina, S.P., Kamatchi, K.B., Mohan, V.R., & Vadivel, V. (2010). The biochemical composition and nutritional potential of three varieties of *Vigna mungo* (L.) Hepper. Advanced Biomedical Research, 1(2), 6-16.

6. Ferguson, L.R. (2001). Role of plant polyphenols in genomic stability. Mutation Research, 75, 8-13.

7. Gamble, J.S. (1967). Flora of the Presidency of Madras', reprinted edition, Botanical Survey of India, Calcutta.

8. Harborne, J.B. (1999). 'Phytochemical Methods, A Guide to Modern Techniques of Plant Analysis', London: Chapman & Hall.

9. Ganatra, S.H., Ramteke, A.M., Durge, S.P., & Patil, S.U. (2013). Phytochemicals investigation and TLC profiling of *Cyamopsis tetragonoloba* L. seeds (fabaceae) - Pea family. International Journal of Pharmaceutical Sciences and Research, 4(4), 1551-1555.

10. Jimoh, F.O., & Oladiji, A.T. (2005). Preliminary studies on *Piliostigma thonningii* seeds: Proximate analysis, mineral composition and phytochemical screening. African Journal of Biotechnology, 4(12), 1439-1442

11. Ismail, A.M., Mohamed, E.A., Marghany, M.R., Abdel-Motaal, F.F., Abdel-Farid, I.B., & El-Sayed, M.A. (2016). Preliminary phytochemical screening, plant growth inhibition and antimicrobial activity studies of *Faidherbia albida* legume extracts. Journal of the Saudi Society of Agricultural Sciences, 15(2), 112-117.

12. Kumar, J.K., Devi Prasad, A.G., & Richard, S.A. (2012). *In vitro* Antioxidant activity and preliminary phytochemical analysis of medicinal Legumes. Journal of pharmacy research, 5(6), 3059-3062.

13. Surewicz, W.K., Mantsch, H.H., & Chapman, D.0 (1993). Determination of

protein secondary structure by Fourier transform infrared spectroscopy: a critical assessment. Biochemistry, 32(2), 389-394.

14. Sundaram, U., Marimuthu, M., Anupama, V., & Gurumoorthi, P. (2013). Comparative antioxidant quality evaluation of underutilized/less common south Indian legumes. International Journal of Pharma and Biosciences, 4(2), 117-126.

15. Carbonaro, M., Maselli, P., Dore, P., & Nucara, A. (2008). Application of Fourier transform infrared spectroscopy to legume seed flour analysis. Food Chemistry, 108(1), 361-368.

16. Carbonaro, M., Maselli, P., & Nucara, A. (2012). Relationship between digestibility and secondary structure of raw and thermally treated legume proteins: a Fourier transform infrared (FT-IR) spectroscopic study. Amino acids, 43(2), 911-921.