ONCOGEN

ISSN: 2641-9475

Research Article 2019; 2(1): 2

Chromatographic Fractionation of An Ethanolic Extract of Peels from *Ipomoea batatas* Lam for Improved Anticancer Activity

Oluyori Abimbola P[1*], Olatunji Gabriel A[2], Shaw Arun K[3], Rastogi Preeti[3], Sanjeev Meena[4], and Dipak Datta[4]

[1]Department of Physical Sciences, Landmark University, Omuaran, Kwara State, Nigeria

[2]Department of Industrial Chemistry, University of Ilorin, Ilorin, Nigeria

[3]Medicinal and Process Chemistry Division, Central Drug Research Institute, Lucknow, India

[4]Biochemistry Division, Central Drug Research Institute, Lucknow, India

[*]Corresponding author:

Oluyori Abimbola P

Department of Physical Sciences,
Landmark University, Omuaran, Kwara State, Nigeria

Received : December 29, 2018

Published : January 15, 2019

Abstract

In this current work, the n-hexane fraction from an ethanolic extract of pulverized peel of *Ipomoea batatas* Lam was subjected to chromatographic fractionation. Consequently, the fractions were investigated for their anticancer potential using the Sulforhodamine-B assay. Chromatographic fractionation led to n-hexane sub-fractions with greater anticancer potential. The study highlights the peel of *Ipomoea batatas* Lam as a rich dietary source of natural anticancer molecules which may be developed into nutraceuticals or serve as new leads in anticancer therapy.

Keywords: *Ipomoea batatas*; Chromatography; Fractionation; Anticancer; Sulforhodamine-B

Introduction

Cancer has been identified as a major cause of death in various parts of the world including the United States disease [1]. Despite the fact that several chemical treatments such as doxorubicine exist for this disease [2], the observed toxicity of such drugs contributes greatly to the current search for more natural product alternatives which may offer more convenient treatment [3]. Sweet potato is an important bio-resource from which several medicinal compounds have been isolated and characterized. Following the notable discovery of the Batatins by Escalante-Sanchez, et al. [4], we made several attempt to valorize sweet potato peels [5-7] and recently reported a bioassay guided fractionation/isolation of a cerebroside from the peels of a white skinned variety of sweet potato [8]. However, several chromatographic fractions which exhibited anticancer activity were not reported therein. Therefore, we herein present the chromatographic fractionation and the anticancer potential of these fractions which could be good starting point for HPLC isolation of novel anticancer agents.

Experimental Design, Materials and Methods

Material

White skinned variety of *Ipomoea batatas* Lam was purchased from a local market in Kwara State, identified by a taxonomist in the Department of Plant Science herbarium, University of Ilorin and a voucher specimen number UIH 001/486 was obtained. The peel was afterward removed and air-dried at room temperature. 25 liters of 95% ethanol percolated the pulverized *Ipomoea batatas* Lam to give 112 g of the ethanolic extract (IB A001) after concentration using rotary evaporator at 50°C.

Fractionation

The extract was initially fractionated into n-hexane, ethyl acetate, butanol and water. The n-hexane fraction was afterwards fractionated chromatographically, using a gradient

DOI: https://doi.org/10.35702/onc.10002

ISSN: 2641-9475
2019; 2(1): 2

of ethyl acetate in n-hexane on a silica gel (100-200 mesh) column, into IB F002 a, IB F002 b and IB F002 c (Table 1). IB F002 c was then further fractionated over silica gel CC using chloroform/methanol (1:0 » 0:1, v/v), as eluent affording 40 fractions of 20 ml each (Table 2). Thin Layer Chromatography was used to group the fractions.

Sulforhodamine B assay

The fractions were investigated for their inhibitory potential against Colon 1-DLD-1, Colon-2-SW-620, Breast-1-MCF-7, Breast-2-MDA-MB-231, Lung-A549 and Head and neck-FaDu (American Type Culture Collection, USA) according to the method described by Shagun et al. [9].

Results and Discussion

The percentage inhibition of various cancer cell lines by 100 µg/ml of various chromatographic fractions from *Ipomoea batatas* peel extract is shown in Table 1. The highest anticancer inhibitory activity which was found in IB F002 c was 76.79%, 64.31%, 93.72%, 84.35% and 77.72% for colon-1, colon-2, breast, lung and head and neck cancer cell lines respectively.

Table 1: Anticancer activity of n-hexane (IB F002) chromatographic fractions.

SN	Fraction	% Inhibition at 100 µg/ml				
		Colon-1	Colon 2	Breast-1	Lung	Head and Neck
1	IB F002 a I	-4.65	-7.78	-3.81	6.64	8.04
2	IB F002 a II	8.88	-9.31	9.05	17.89	23.64
3	IB F002 a III	8.36	-8.20	5.64	21.31	13.68
4	IB F002 a IV	8.98	-12.30	2.02	14.13	7.43
5	IB F002 a VI	47.4	9.19	35.17	41.47	46.96
6	IB F002 a VII	52.28	19.84	44.36	50.34	57.1
7	IB F002 a VIII	37.64	-0.76	24.63	39.74	34.75
8	IB F002 a IX	39.03	10.73	24.37	37.01	39.48
9	IB F002 b	64.78	50.71	58.21	67.81	79.84
10	IB F002 c	76.79	64.31	93.72	84.35	77.72

IB F002 a V was not tested; it was insoluble in DMSO

Table 2: Anticancer activity of IB F002c sub-fractions.

SN	Fraction	% Inhibition at 100 µg/ml				
		Colon-1	Colon 2	Breast-1	Lung	Head and Neck
1	IB F002 c CC_1	-0.04	2.78	-0.21	-3.06	-1.56
2	IB F002 c CC_{2-15}	-2.37	-11.98	24.96	19.21	17.17
3	IB F002 c CC_{16}	18.72	-23.09	17.00	9.36	36.37
4	IB F002 c CC_{17}	-5.31	-9.02	20.24	14.73	5.72
5	IB F002 c CC_{18}	17.17	-1.03	88.61	76.77	58.51
6	IB F002 c CC_{19}	7.16	-13.21	82.39	58.82	44.00
7	IB F002 c CC_{24-25}	43.09	81.28	88.69	53.93	96.91
8	IB F002 c CC_{26-30}	75.09	91.95	93.55	75.22	98.12
9	IB F002 c CC_{31-36}	64.70	89.55	95.25	73.96	98.99
10	IB F002 c CC_{37}	96.05	90.20	97.76	93.53	99.68

Fraction IB F002 c CC_{20-23} was not done; It was insoluble in DMSO

Furthermore, Table 2 shows the cancer inhibitory potential of the chromatographic fractions from IB F002c which had relatively higher anticancer potential. While fractions IB F002 c CC_{24-25}, IB F002 c CC_{26-30}, IB F002 c CC_{31-36}, and IB F002 c CC_{37} all exhibited high inhibition of Head and neck cancer, fraction IB F002 c CC_{37} had the highest inhibition of all examined cancer cell lines. Head and neck cancer has been known to constitute a financial burden to patients due to complex treatment pathways and the accompanying high cost [10]. Hence, the use of sweet potato peels as a nutraceutical bioresource to prevent cancer or the direct use of sweet potato peel extract in anticancer therapy may be a cheap escape from cancer health burden in the world today. These results provide a good starting point for HPLC isolation and characterization of novel compounds in anticancer therapy.

Acknowledgements

This work was supported by Third World Academy of Sciences and Council for Scientific and Industrial Research/Central Drug Research Institute, Lucknow, UP, India.

Conflict of Interest: The authors declare no conflict of interest.

DOI: https://doi.org/10.35702/onc.10002

ISSN: 2641-9475
2019; 2(1): 2

References

1. https://cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer

2. Agudelo D, Bourassa P, Berube G, Tajmir-Riahi HA (2016) Review on the binding of anticancer drug doxorubicin with DNA and tRNA: Structural models and antitumor activity. J Photochem Photobiol B, Biol 158: 274-279.

3. Thorn CF, Oshiro C, Marsh S, Hernandez-Boussard T, McLeod H, Klein TE, et al. (2011) Doxorubicin pathways: pharmacodynamics and adverse effects. Pharmacogenet Genomics 21(7): 440-446.

4. Escalante-Sanchez E, Pereda-Miranda R (2007) Batatins I and II, ester-type dimers of acylated pentasaccharides from the resin glycosides of sweet potato. J Nat Prod 70(6): 1029-1034.

5. Oluyori A, Olatunji GA (2015) PhytochemicalAnalysis, Antimicrobial and Antioxidant Activity of Peels' extracts from Ipomoea batatas Lam. J Intl Res Med Pharmaceut Sci 6(4): 157-164.

6. Oluyori AP, Shaw AK, Preeti R, Reddy S, Atolani O, Olatunji GA, et al. (2016) Natural antifungal compounds from the peels of Ipomoea batatas Lam. Nat Prod Res 30(18): 2125-2129.

7. Oluyori AP, Olatunji GA, Atolani O (2013) Alkyd resin from Ipomoea batatas Lam. Pak J Sci Ind Res 56(1): 57-58.

8. Oluyori AP, Shaw AK, Olatunji GA, Rastogi P, Meena S, Datta D, et al. (2016) Sweet potato peels and cancer prevention. Nutr Cancer 68(8): 1330-1337.

9. Krishna S, Singh DK, Meena S, Datta D, Siddiqi MI, Banerjee D (2014) Pharmacophore-based screening and identification of novel human ligase I inhibitors with potential anticancer activity. J Chem Inf Model 54(3): 781-792.

10. Wissinger E, Griebsch I, Lungershausen J, Foster T, Pashos CL (2014) The economic burden of head and neck cancer: A systematic literature review. Pharmacoeconomics 32(9): 865-882.

Citation: Oluyori AP (2019). Chromatographic Fractionation of An Ethanolic Extract of Peels from *Ipomoea batatas* Lam for Improved Anticancer Activity. Oncogen. 2(1): 2

DOI: https://doi.org/10.35702/onc.10002