

Sargassum sp has higher Phenolic contents than *Iyengaria* sp

GHAZALA BUTT^{1*}, EJAZ HUSSAIN¹, ABDUR REHMAN KHOKHAR², SIDRA HASNAIN³

ABSTRACT

Background: There is a considerable increase in the field of molecular biology as evidenced by advancements in genetics, genomics and proteomics. With overwhelmingly expanding information about human diseases, the identification of bioactive ingredients isolated from natural sources has also gained tremendous appreciation.

Methods: *Sargassum* sp and *Iyengaria* sp were collected from southeast coast of Karachi. The powdered seaweed samples (500 g of *Sargassum* sp and *Iyengaria* sp) were extracted with methanol in conical flasks at room temperature for three weeks. The samples were filtered using Whatman filter paper to obtain clarified filtrates. Phenol contents were evaluated.

Results: Methanolic extract of *Sargassum* sp shows the highest phenolic contents of 677.74 (mg/ml) and *Iyengaria* sp shows phenolic content with value 471.6 mg/ml.

Conclusion: This is a preliminary study highlighting potential of *Sargassum* sp and future studies must converge on in-vitro analysis of these species for a better understanding of the protein and gene network regulated by phenols.

Keywords: *Sargassum* sp, phenolic content, *Iyengaria* sp

INTRODUCTION

There is a rapidly accumulating evidence of identification of bioactive ingredients from algae. Bromophenols isolated from *Symphyclocladia latiuscula* have shown notable antifungal activity (Xu et al, 2014). It is interesting to note that polyphenols isolated from *Padina boergesenii* considerably reduced ferric nitrotriacetate induced renal oxidative damage in rats (Rajamani et al, 2014). Two novel phlorotannins purified from polyphenol powder prepared from *Ecklonia kurome* Okamura displayed strong antioxidant activity (Yotsu-Yamashita et al, 2013). Dieckol and phlorofucofuroeckol isolated from edible brown alga, *Eisenia bicyclis* also revealed remarkable antioxidant potential (Kwon et al, 2013). Polyphenol-Rich Fraction of Brown Alga *Ecklonia cava* has been noted to effectively reduce obesity and glucose levels in high-fat diet-induced obese mice (Park et al, 2012). The study was designed to analyze phenolic contents of *Sargassum* sp and *Iyengaria* sp.

MATERIALS AND METHODS

Algal Material: Seaweeds used in this study were *Sargassum* sp and *Iyengaria* sp. The seaweeds were collected during the winter season in the month of

Feb. 2013, from, Sandspit, Hawkesbay, Buleji, Haji Goth and Paradise Point region on the southeast coast of Karachi Pakistan respectively. The seaweeds samples were dried, and powdered after washing thoroughly in fresh water to remove salt and other unwanted materials and stored in airtight containers at room temperature for further study. The powdered shad-dried seaweed samples (500 g of *Sargassum* sp and *Iyengaria* sp) were extracted with methanol in conical flasks (1500 ml) (Volumetric flasks, (Pyrex) 1000 cm³) respectively at room temperature for three weeks. The samples were filtered by Whatman filter paper (Whatmann filter paper no. 1, 2, 41, and 42.) to obtain clarified filtrates (1L and 800 ml respectively) which was evaporated (65°C -70°C) using rotary evaporator (Stuart RE300 Rotary evaporator, Germany equipped with Stuart RE3022C Vacuum pump, Germany and chiller) under vacuum for dryness to give rise a dark green viscous oily mass (17.34 g and 19.08 g respectively) of methanolic crude extract. The methanolic crude extract (5 mg) was mixed with (1 ml) of methanol for antioxidant activity.

Total Phenolic Contents: Total phenolic content of *Sargassum* sp and *Iyengaria* sp were determined with the Folin-Ciocalteu's reagent method. Concisely, 0.1 ml (5 mg/ml) of a sample was mixed with 2.0 ml of 2% Na₂CO₃ and keep at room temperature for 2 min. 0.1 ml of 50% reagent of Folin-Ciocalteu's phenol mixture was added, after that the reaction reagent was vigorously mixed and keeps it to room temperature for 30 min. After completion of incubation period, absorbance of algal

¹Department of Botany, GCU, Lahore, ²Department of Radiology, Rashid Latif Medical College, Lahore, ³Department of Pharmaceutical Sciences, Superior University, Lahore.

*Correspondence to Dr. Ghazala Butt, Email: drghazala71@yahoo.com

sample was noted at 720 nm with the help of spectrophotometer. Different volumes of quercetin (1 mM) were used as standards.

RESULTS AND DISCUSSION

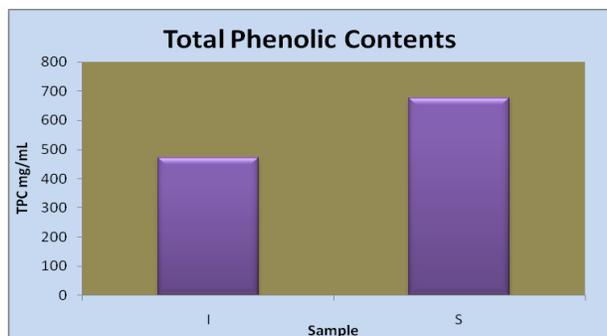


Figure: Total Phenolic Contents of *Sargassum* and *Iyengaria* sp

Methanolic extract of *Sargassum* sp shows the highest phenolic contents of 677.74 (mg/ml) and *Iyengaria* sp shows phenolic content with value 471.6 mg/ml. There is a progressive increase in research work addressing identification of wide ranging biological activities of polyphenols. Two novel phlorotannins purified from polyphenol powder prepared from *Ecklonia kurome* Okamura displayed strong antioxidant activity (Yotsu-Yamashita et al, 2013). There are exciting pieces of evidence suggesting role of polyphenols isolated from *Limoniastrum guyonianum* aqueous gall extract in inducing apoptosis in colorectal cancer cells Krifa et al, 2014. It has recently been convincingly revealed that polyphenolics from peach substantially reduced cancer growth in xenografted mice Noratto et al, 2014. Confluence of information also has started to shed light on approaches to maximize bioavailability of polyphenols and in line with this approach, chitosan-based nanoformulated green tea polyphenol EGCG significantly inhibited cancer development in xenografted mice Khan et al, 2014. This is a preliminary study highlighting potential of *Sargassum* sp and future studies must converge on in-vitro

analysis of these species for a better understanding of the protein and gene network regulated by phenols.

REFERENCES

1. Xu X, Yin L, Gao J, Gao L, Song F. Antifungal Bromophenols from Marine Red Alga *Symphyclocladia latiuscula*. *Chem Biodivers*. 2014 May;11(5):807-11.
2. Rajamani K, Renju VC, Sethupathy S, Thirugnanasambandan SS. Ameliorative effect of polyphenols from *Padina boergeresii* against ferric nitrilotriacetate induced renal oxidative damage: With inhibition of oxidative hemolysis and in vitro free radicals. *Environ Toxicol*. 2014 Jan 24. doi: 10.1002/tox.21951.
3. Yotsu-Yamashita M, Kondo S, Segawa S, Lin YC, Toyohara H, Ito H, Konoki K, Cho Y, Uchida T. Isolation and structural determination of two novel phlorotannins from the brown alga *Ecklonia kurome* Okamura, and their radical scavenging activities. *Mar Drugs*. 2013 Jan 18;11(1):165-83.
4. Kwon TH, Kim TW, Kim CG, Park NH. Antioxidant activity of various solvent fractions from edible brown alga, *Eisenia bicyclis* and its active compounds. *J Food Sci*. 2013 May;78(5):C679-84.
5. Park EY, Kim EH, Kim MH, Seo YW, Lee JI, Jun HS. Polyphenol-Rich Fraction of Brown Alga *Ecklonia cava* Collected from Gijang, Korea, Reduces Obesity and Glucose Levels in High-Fat Diet-Induced Obese Mice. *Evid Based Complement Alternat Med*. 2012;2012:418912.
6. Krifa M, Pizzi A, Mousli M, Chekir-Ghedira L, Leloup L, Ghedira K. *Limoniastrum guyonianum* aqueous gall extract induces apoptosis in colorectal cancer cells by inhibiting calpain activity. *Tumour Biol*. 2014 May 15.
7. Noratto G, Porter W, Byrne D, Cisneros-Zevallos L. Polyphenolics from peach (*Prunus persica* var. Rich Lady) inhibit tumor growth and metastasis of MDA-MB-435 breast cancer cells in vivo. *J Nutr Biochem*. 2014 Mar 19. pii: S0955-2863(14)00053-9.
8. Khan N, Bharali DJ, Adhmi VM, Siddiqui IA, Cui H, Shabana SM, Mousa SA, Mukhtar H. Oral administration of naturally occurring chitosan-based nanoformulated green tea polyphenol EGCG effectively inhibits prostate cancer cell growth in a xenograft model. *Carcinogenesis*. 2014 Feb;35(2):415-23.