Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 01, pp.45572-45575, January, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

EVALUATION OF SOME PHYTOCHEMICALS AND *ANTIOXIDANT* PROPERTIES OF SOME SELECTED SEAWEEDS FROM MANDAPAM COAST, TAMILNADU, (SOUTHEAST COAST OF F INDIA)

***Gandhiyappan, K.**

Assistant Professor, PG and Research Department of Botany, Government Arts College Chidambaram, Tamilnadu

ARTICLE INFO

Article History:
Received 27th October, 2016
Received in revised form
15th November, 2016
Accepted 10th December, 2016
Published online 31st January, 2017

Key words:

Phytochemicals, Phenol,
Carotenoids, Flavonodis,
Antioxidant.

ABSTRACT

The methanol extract of four seaweeds collected from Mandapam coast were determined using phytochemicals of total phenolic activity, **c**arotenoids, flavonoids and antioxidant potential assay The methanol extract of brawn seaweed *Sargassum weightii* showed higher phenolic content than all green seaweed *U lva lactuca, Caulerpa taxifolia.* Higher antioxidant activity was also observed in mathanol extract of *Sargassum weightii*. The minimum values were observed in *Ulva lactuca* In the present study, the extract of *Sargassum weightii* and *Caulerpa taxifolia* was found to possess strong antioxidant activity.

Citation: Gandhiyappan, K. 2017. "The work situation and working conditions of child labour n meerut city (u.p.)", *International Journal of Current Research*, 09, (01), 45572-45575.

INTRODUCTION

The use of seaweed as food and medicine prior to 2000BC found mention in ancient Chinese medicinal literature (Abbott, 1996). Seaweeds also have a number of secondary metabolites that serve as chemical defense mechanisms against herbivores and fouling (De Nys *et al.,* 1998, De Lara-Isassi *et al.,* 2000). It is thus highly probable that algae have the potential to provide an alternative source of leads in solving many biomedical problems, including oxidative damage (Ruberto *et al.,* 2002). Seaweeds are receiving much attention mainly because of their contents of functional ingredients such as polyunsaturated acids, carotene and their pigment carotenoids, sulphated polysaccharide and sterol, Vijayabaskar and Shiyamala 2011. Though diverse phytoconstituents from various seaweed species has been reported and several compounds have been derived from them for prospective development of novel products, there is still an enormous number of species to be explored. One such algal species is the marine red algae, *Halymenia dilatata* (Uma Maheswari and Reena, 2017). Seaweeds are rich in antioxidants such as carotenoids, pigments, polyphenols, enzymes and diverse functional polysaccharides (Vinayak, 2011). Seaweeds act as a good contributor to iodine (Apaydin *et al*., 2010) which could be consumed by animals as a potential source of iodine in thyroid malfunction. Iodine content was found in the range of 30 to 2984 mg kg-1 in seaweeds (Jane-Teas *et al*., 2004). Seaweeds are a greater source of ions, minerals and metals which might be absorbed or adsorbed during its dwelling on seashores and are collectively evidenced as its ash content. Ash content reported in seaweeds range from 9.3 to 77.8 % (Sara-Marsham *et al.,* 2007). The energy that could be generated by the organism utilising its biochemical composition upon ignition is derived as the calorific value and this value varied from 0.64 to 4.37 $kcalg^{-1}$ (Sara- Marsham *et al.,* 2007). Seaweeds are also appreciable sources of carotenoids, vitamins and flavonoids and these beneficial constituents make the use of seaweeds in pharmaceutical activities. The present study were undertaken to investigate the biochemical composition and evaluate the antioxidant potential of the seaweeds such as *Ulva lactuca, caulerpa taxifolia, Sargassum weightii* and *Gracilaria biknahiae* collected from the Mandapam coast, Tamilnadu, Southeast Coast of f India,.

****Corresponding author:*** **Gandhiyappan, K.,**
Assistant Professor, PG and Research Department of Botany, Government Arts College Chidambaram, Tamilnadu

MATERIALS AND METHODS

Four species of seaweeds *U lva lactuca, Caulerpa taxifolia, Sargassum weightii and Gracilaria biknahiae* collected from Mandapam (Rameswaram) coast. The sample was washed with tap water to remove dirt, sand and was shade dried until constant weight was obtained. It was powdered in an electric mixer and powder was stored in refrigerator for future use.

Extraction of seaweed: 500g of the dried seaweed powder was placed in soxhlet apparatus (Perfit, India) and subjected to successive extraction using methanol and macerated to form an aqueous extract. Subsequently, extracts were filtered and the filtrate was evaporated using vacuum evaporator (Perfit, India) under reduced pressure at ≤ 50° C temperature. The crude extract obtained after evaporation was stored in desiccator. After extraction with various solvent remaining residue of leaves was discarded and extract was weighed.

Estimation of Carotenoids: The carotenoid content of seaweeds was determined by following the Kirk and Allen method. The extract that was used for the chlorophyll estimation was used for carotenoid estimation also. The same chlorophyll extract was measured at 480nm in UV-spectrophotometer to estimate the carotenoid content.

Carotenoid (mg/g. dr. wt) = ΔA480 + (0.114 × ΔA663) – (0.638 × ΔA645)

ΔA = Absorbance at respective wavelength

Total Phenolic Content: The amount of total phenolic in methanol extract was determined with Folin– Ciocalteu reagent according to the method of Singleton and Rossi with Gallic acid as the standard Singleton and Rossi (1965)**.** Briefly, standard stock solution of 10 mg/10 ml of gallic acid was prepared in distilled water. From this, various concentrations ranging from 200-1000 µg / ml were prepared. To this 1 ml Folin and Ciacalteau reagents (1:2 with water) was added and kept at room temperature for 5 min and then 1 ml of 7% sodium carbonate solution was added to the reaction mixture and incubated at room temperature for 90 minutes. The colour developed was read at 750 nm. A 100 µl of methanol extract of sample was mixed with the same reagents. Gallic acid was used as the reference standard and the results are expressed as milligram gallic acid equivalent (mg / g dry weight of seaweed).

Flavonoids Content: Aluminium chloride colorimetric technique was used for flavonoids estimation (Chang *et al*., 2002). 0.5 ml of sample, 0.1 ml of 10% aluminium chloride, 0.1 ml of 1 M potassium acetate, 2.8 ml of distilled water were taken and mixed in the given order. It was left at room temperature for 30 minutes after which the absorbance of the reaction mixture was measured at 415 nm. The calibration curve was prepared using Quercetin solution (20-100µg) in methanol.

Total antioxidant activity: Total antioxidant activity of seaweed extracts was determined according to the method Pineda *et al*. (1999). Briefly, 0.3 ml of sample was mixed with 3 ml of reagent solution (0.6 M sulphuric acid, 28 mM sodium phosphate and 4 mM ammonium molybdate). The reaction mixture was incubated at 95° C for 90 min. Absorbance of the sample was measured at 695 nm. Total antioxidant activity is expressed as the number of equivalence of ascorbic acid in milligram per gram of extract.

RESULTS AND DISCUSSSION

The maximum level carotenoids was observed in (0.61 ± 0.051) in *Ulva lactuca* and low (0.49 ± 0.001) in *Sargassum weightii*. The values were 0.61± 0.051 and 0.51± 0.032 respectively in *Caulerpa taxifolia* and *Gracilaria biknahiae*. The total phenol was high (39.07± 2.00) in *Sargassum weightii* and low (29.40 ± 1.20) in *Ulva lactuca*. The distribution of flavonoids in the 15 species of seaweeds from Visakhapatnam coast was earlier reported Nayak Sarojini *et al*, (2013). Extract of Caulerpa sp were reported to be exhibiting high phenolic content and also relatively high DPPH radical scavenging activities among the Chlorophyta species (Zubia *et al*., 2007). In the present study, methanol extracts showed recorded desirable limits to all the seaweed samples. (Olfachiboub *et al*., 2017) reported that Total Phenolic Compounds in different organic extract, to evaluate antioxidant capacity (DPPH and ABTS) and to study the antiprotozoal activity against A. castellanii Neff. Many reports show that presence of phenols etc., in seaweeds are responsible for its antioxidant activity (Shibata *et al*., 2008). Among the Chlorophyceae the flavonoid content varied from 8.43 to 33.39 mg/g with a mean value of 19.24 mg/g. In the present study, *Caulerpa taxifolia* showed higher value whereas *Ulva lactuca* showed within the range as earlier reported. Phenolic compounds are commonly found in plants, including seaweeds, and have been reported to show a wide range of biological activities including antioxidant properties Kuda *et al*.(2007) and Athukorala *et al*.(2006). Total flavonoids are probably the most important natural phenol due to their broad spectrum of chemical and biological activities, including antioxidant and free radical scavenging properties. Flavonoids have been reported as antioxidants of a wide range of reactive oxygen species and inhibitors of lipid peroxidation and as potential therapeutic agents against a wide variety of diseases. It has been reported that the presence of phyto-constituents such as flavonoids, tannins and polyphenols (Soad M. Mohy El-din and Amani M.D. El- Ahwany, 2015). Scavenging properties. Literature on flavonoids content of seaweeds is very scarce (Subramanian *et al*., 2014). In this study extracts of *ulva lactuca, caulerpa taxifolia, sargassum weightii* and *gracilaria biknahiae* showed significant free radical scavenging activity and these results are comparable to the earlier studies (Subramanian *et al*., 2014). The *Gracilaria biknahiae* and *Caulerpa taxifolia* were recorded with 32.69 ± 1.13 and 31.75± 1.34 respectively. The maximum level flavonoids was observed in (46.290 ± 0.44) in *Sargassum weightii* and low (29.49 ± 0.56) in *Ulva lactuca*. The values were 31.32± 0.58 and 38.30 ± 0.58 respectively in *Caulerpa taxifolia* and *Gracilaria biknahiae*. The maximum antioxidant was observed in (26.94 ± 1.55) in *Sargassum weightii* and low (19.38 ± 0.47) in *Ulva lactuca*. The antioxidant values were 19.38± 0.47 and 21.38 ± 0.59 respectively in *Caulerpa taxifolia* and *Gracilaria biknahiae*. Antioxidant activity of marine algae may arise from pigments such as chlorophylls, carotenoids, vitamins and vitamin precursors, including cophenol, carotene, niacin, thiamine, ascorbic acid and phenolic compounds, such as polyphenols, hydroquinones and flavonoids. Phos- pholipids, particularly phosphatidylcholine, terpenoids, peptides, and other antioxidative substances, directly or indirectly contributed to the inhibition or suppression of oxidation processes (Soad M. Mohy El-din and Amani M.D. El- Ahwany, 2015). Flavonoids are known to show a broad spectrum of chemical and biological activities including antioxidant and free radical. Scavenging properties. Literature on flavonoids content of seaweeds is very scarce (Subramanian *et al*., 2014). In this study extracts of *ulva lactuca, caulerpa taxifolia, sargassum weightii* and *gracilaria biknahiae* showed significant free radical scavenging activity and these results are comparable to the earlier studies (Subramanian *et al*., 2014).

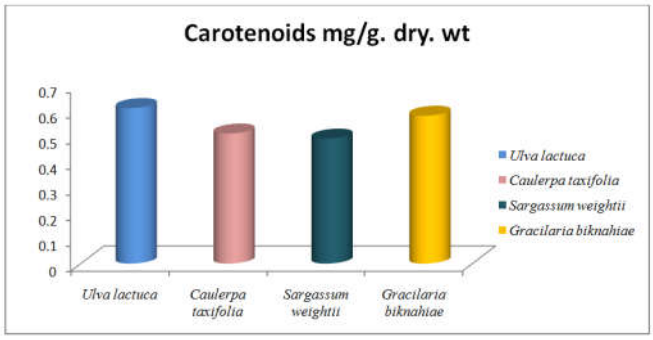

Fig. 1. Carotenoids level of *Ulva lactuca, Caulerpa taxifolia, Sargassum weightii* and *Gracilaria biknahiae*

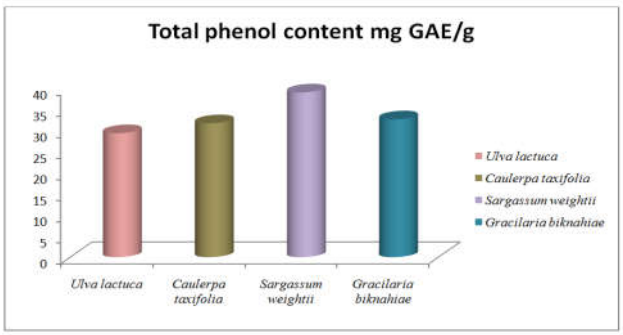

Fig. 2. Total phenol level of *Ulva lactuca, Caulerpa taxifolia, Sargassum weightii* and *Gracilaria biknahiae*

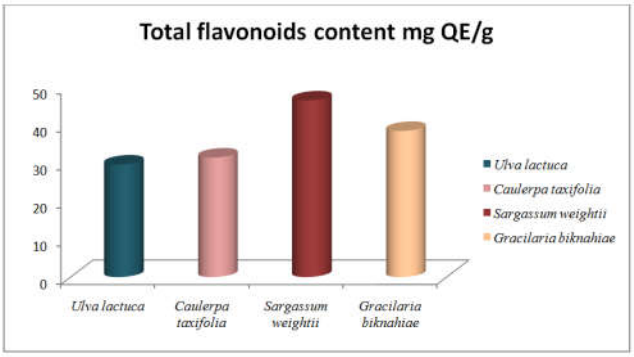

Fig. 3. Total flavonoids level of *Ulva lactuca, Caulerpa taxifolia, Sargassum weightii* and *Gracilaria biknahiae*

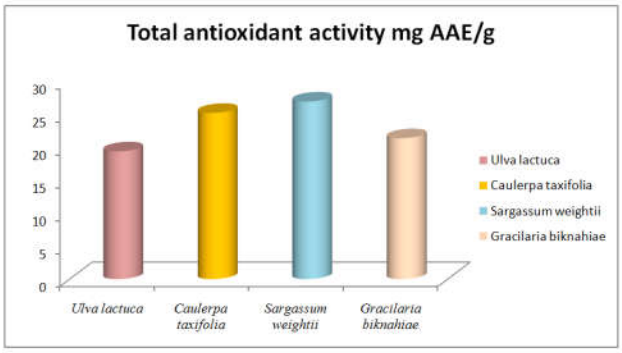

Fig. 4. Total antioxidant level of *Ulva lactuca, Caulerpa taxifolia, Sargassum weightii* and *Gracilaria biknahiae*

The *Gracilaria biknahiae* and *Caulerpa taxifolia* were recorded with 32.69 ± 1.13 and 31.75± 1.34 respectively. The maximum level flavonoids was observed in (46.290 ± 0.44) in *Sargassum weightii* and low (29.49 ± 0.56) in *Ulva lactuca*. The values were 31.32± 0.58 and 38.30 ± 0.58 respectively in *Caulerpa taxifolia* and *Gracilaria biknahiae*. The maximum antioxidant was observed in (26.94 ± 1.55) in *Sargassum weightii* and low (19.38 ± 0.47) in *Ulva lactuca*. The antioxidant values were 19.38± 0.47 and 21.38 ± 0.59 respectively in *Caulerpa taxifolia* and *Gracilaria biknahiae*. Antioxidant activity of marine algae may arise from pigments such as chlorophylls, carotenoids, vitamins and vitamin precursors, including cophenol, carotene, niacin, thiamine, ascorbic acid and phenolic compounds, such as polyphenols, hydroquinones and flavonoids. Phos- pholipids, particularly phosphatidylcholine, terpenoids, peptides, and other antioxidative substances, directly or indirectly contributed to the inhibition or suppression of oxidation processes (Soad M. Mohy El-din and Amani M.D. El- Ahwany, 2015). Flavonoids are known to show a broad spectrum of chemical and biological activities including antioxidant and free radical.

REFERENCES

Abbott, J., 1996. Sharing the city: community participation in urban management. Earthscan Publication, London.

Apaydin, G., V. Aylıkcı, E. Cengiz, M. Saydam, N. Küpl, and E. Tıraşoğlu, 2010. Analysis of Metal Contents of Seaweed (*Ulva lactuca*) from Istanbul, Turkey by EDXRF, Turkish, *J. Fisheri. & Aqua. Sci.*, 10: 215-220.

Athukorala, Y., K. N. Kim, .and Y. J. Jeon, 2006. Antiproliferative and antioxidant properties of an enzymatic hydrolysate from brown alga, *Ecklonia cava*. *Food and Chemical Toxicology*, 44, 1065-1074.

Chang, C.C., M.H. Yang, H.M. Ucen, J.C. Chern, 2002. Estimation of total flavonoids content in propolis by complementary colorimetric method, *J. of food and dru analysis.* 10 : 178-182.

De lara Isassi, G., S. Alvarez-Hernandez, and Collado-Vides L. 2000. Ichtyotoxic activity extracts from Mexico marine macroalgae. J. Appl. Phycol. 12: 45-52.

De Nys, R., S. A. Dworjanyn, and Steinberg P. D. 1998. A new method for determining surface concentrations of marine natural products on seaweeds. Mar. Ecol. Prog. Ser. 162:79-87.

Jane Teas, Sam Pino, Alan Critchley, and Lewis E. Braverman, 2004. Variability of iodine content in common commercially available edible seaweeds. THYROID, V14, Mary Ann Liebert, Inc.

Kuda, T., T. Kunii, H. Goto, T.Suzuki and T. Yano, 2007. Varieties of antioxidant and antibacterial properties of *Eckloniastoloniferaand Eckloniakurome* products harvested and processed in the Noto peninsula, Japan. *Food Chemistry,*103, 900-905.

Nayak, S., R. Prasanna, A. Pabby, T.K. Dominic and P.K. Singh, 2004. Effect of *BGA-Azolla* biofertilizers on nitrogen fixation and chlorophyll accumulation at different depths in soil cores. *Biol. Fert. Soils,* 40: 67-72.

OlfaChiboub, LeilaKtari InesSifaoui, AtteneriLópez-Arencibia, MariaReyes-Batlle, MondherMejri, BasilioValladares, ManefAbderrabba José, E.Piñero and JacobLorenzo-Morales, 2017. In vitro amoebicidal and antioxidant activities of some Tunisian seaweeds. Experimental Parasitaology, 183:76-80.

Pineda M, P. Prieto and M. Aguilar, 1999. Spectrophotometric quantitation of antioxidant capacity through the formation of a phosphomolybdenum complex: specific application to

the determination of vitamin E. Anal Biochem, 269(2): 337-341.

Ruberto, G., M. T. Baratta, and Kaabeche M. 2002. Chemical composition and antioxidant activity of essential oils from Algerian Origanum glandulosum Desf. Fla. Fragr. J. 17: 251 254.

Sara Marsham., W. Graham Scott, L. Michelle ,Tobin, 2007. Comparison of nutritive chemistry of a range of temperate seaweeds. *Food Chemistry,* 100: 1331-1336.

Shibata, T., K. S. IshimaruKawaguchi, H. Y. YoshikawaHama (2008). Antioxidant activities of phlorotannins isolated from Japanese Laminariaceae. *J. Appl.Phycol*.20:705-711

Singleton, V.L , A.J. Rossi, (1965). Colorimetry of total phenolics with phosphomolybdic- phosphotungstic acid reagents, *Am. J. of Enol. Viticu*. 6 : 144- 158.

Soad M. Mohy El-din and Amani M.D. El- Ahwany, 2015. Phytochemical Analysis and In vitro Antifungal Activities of Bioactive Fractions from Leaves of Rhus coriaria (SUMAC) *J. Pure Apply. Mic.*, 9: 559-565.

Subramanian G, J. Stephen, P .Manjunathan and M.B.Anusha, 2014. Biochemical Composition of Three Selected Green Seaweeds from Vadakadu (Rameswaram) Coast, Tamil Nadu, India. *Int.J. Adv. Inter.Res.* 1(4): 20-24.

Uma Maheswari M and A. Reena, 2017. Phytochemical Profiling of the Red Seaweed, *Halymenia dilatata* by GC-MS Analysis*, Int. J. of Phar. Sci. and Res.,* 8(8): 167-171.

Vijayabaskar and Shiyamala 2011. Antioxidant properties of Seaweed polyphenols from Turbinaria ornate (Turner) *J. Agardh,* 1848

Vinayak, C.R., A.S. Sabu, A. Chatterji, 2011. Bio-Prospecting of a Few Brown Seaweeds for Their Cytotoxic and Antioxidant Activities, Evidence-Based Complementary and Alternative Medicine, 024:1- 9.

Zubia, M., D. Robledo, Freile-Pelegrin Y. 2007. Antioxidant activities in tropical marine macro-algae from the Yucatan Peninsula. *Mexico, J. Appl. Phycol*.19: 449-458.

****