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Anti-cancerous attributes of marine seaweeds: A concise review

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Abstract

Cancer is the association of many diseases it deals with anomalous cell proliferation besides the capacity to invade other body parts. The uncontrolled escalation of cells and migration of these cells to other parts of the body leads to benign and malignant tumors. The biggest challenge in cancer drug remedy is to develop drug or medicines that attack only tumor cells and not affect the healthy ones. This kind of targeted therapy helps us to ignore the devastating side-effects of chemotherapy. This review discusses the anticancerous properties of aquatic seaweeds as this would protect the cells from consequences of chemotherapy. This paper approaches key resource knowledge about marine algae, bioactive compounds produced by algae along with the mechanism regarding extraction of these biologically active compounds. In the current literature, data concerning extraction of anticancerous compounds present in marine seaweeds are reviewed and also it focused on various methods involved in extraction of phytochemical extracts which will be subjected for screening for anticancerous attributes. Marine algae are gratified as considerable sources of natural bioactive substances and at hand has now emerged a new inclination towards separating and identifying such substances and constituents from algae. Additionally, it also includes suspended studies about algal anticancer agents and was completed to communicate the glare of promotion of recent investigation pertaining to the likely effects of bioactive components of algae on cancer. Conversely, more investigations required to be performed to entirely make use of its anticancer properties such as resolve the nature of cell death caused by the extract or visual detection.

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Introduction

Cancer is a threatening disease that has its worldwide incidences. Mostly, every organ and tissues require a balance between cell renewal and cell death. Corpuscles in human beings acquire life senility and the particular cell drones advancement is provoked by escalation of stem cells. Beneath the favourable situation, the growth regarding these latest corpuscles are governed efficiently leading to constant number of specific corpuscles. Once these corpuscles are unrestraint their capability to respond to cells in controlled mechanism produces clones of cells that expand to create tumors or neoplasm. A cyst that is incapable of endless growth and is unable to invade the flourishing tissues nearby extensively is termed as benign. Cysts that progresses through maturation become successively invasive are malignant (Zorofchian *et al.,* 2014). Cancer is specifically a term for destructive tumors and therefore, apart from uncontrolled growth malignant tumor leads to metastasis. The cancerous cells extricate outside the lump and breach the plasma and even lugs into auxiliary corpuscles culminating to uninterrupted progress. The initial elementary tumor at a site generates subordinate tumor at other locations. Cancers are diversified in regard with the embryonic inception regarding the bulk of corpuscles from which the tumors are originated. Recently, there has been an interest in the investigation of naturally occurring products such as carbohydrates, proteins, and secondary metabolites for their potential in treating several cancers (Thangam *et. al.,* 2014) Carcinomas are cysts emanating endodermally from epithelial insulation of visceral parts. Leukemias along with lymphomas are chunk of malignant tumors regarding haemopoeitic cells of bone marrow. The only difference between lymphomas and leukemias is that leukemias proliferate as single cells, whereas lymphomas proliferate in masses (Ibanez *et al.*, 2012). Treatment regarding healthy cultured cells with mutagens, UV radiation, alters their anatomy and development this mechanism is often termed as transformation and prepares the corpuscles proficient enough of creating tumors when injected. Therefore, they are mentioned to have encountered malignant transformation which exhibit similar properties as those of cancers. Various promoter for instance alkylating agents, ultraviolet light and mutagenic radiation culpable for mutation are proven to engender transformations. Induction concerning malignant transformations implicates multiple steps mainly initiation and promotion. Initiation involves transitions in the genome and then promoters stimulate cell divisions leading to malignant transformations (Zorofchian *et al.,* 2014). Homeostasis in natural tissues is always maintained with the aid of regularly coordinated course of corpuscle escalation balanced by corpuscle death. If there is gentle disproportion in each of two at the phase regarding cell procreation or in vicinity of the step of cell death may escort to carcinoma cell phase. The genes that are reprehensible regarding the progress and development of cancerous cells are oncogenes and tumor suppressor genes. Cancer causing genes is diversified into 3 categories that can reflect these different activities such as:-genes that induce cellular escalation, tumor suppressor genes, inhibitors of cellular escalation, genes that govern scheduled cell lysis. The alternative class of proto-oncogenes and the counterparts of the above mentioned oncogenes encode proteins inducing cell escalation. Some of the above mentioned proteins play role as growth factors or growth factor receptors (Ibanez *et al.,* 2012). Another division of proto-oncogenes conceals the product administering as transcription factors. This proto-oncogene develops into oncogenes after mutation thus responsible for unrestrained replication. The cancer associated genes labelled as cancer oppressor genes encodes proteins responsible for obstruction of cellular escalation and squelching of these genes leads to unregulated cell proliferation (Indira *et al.,* 2015). The third category of cancer- associated genes is responsible for supervising scheduled cell lysis and genes in this category encodes protein regimented for blocking or induction of apoptosis. DNA repair genes are regimented for finding and removing DNA mutations and hence termed as caretakers of genome mutations in these DNA repair genes induces stacking of proto-oncogenes and cancer oppressor genes culminating into progression of cancers (Lopez *et al.,* 2000).

The ontogeny against healthy corpuscle to cancerous cells is consistently cascade mechanism of clonal transformation drifted by somatic metamorphosis converting healthy cell to cancerous corpuscle. Features that are familiar regarding several categories of cancers are:-uncontrolled cell escalation, evasion of cell cycle count, growth without signal, rescue from programmed cell death, change in interaction with environment, and conversion from normal cells to metastasis. The path followed by cells to become malignant is highly variable (Murata *et al.,* 2001).Cancer is also considered as genetic disease. The main cause for it is change in acquired genes that govern for development of natural healthy cells the continuous stacking of genetic lesions compulsory (Lopez *et al.,* 2000) for development of cancers is regarded as multiple theory of carcinogenesis (Haugan *et al.,* 1994). Standard treatments of cancer include radiation therapy, adjuvant therapy, chemotherapy, immunotherapy and surgical therapy (Gill *et al.,* 1997). Generally the treatment for cancers is considered as chemotherapy (Sayanova *et al.,* 2004), but the defiance to chemotherapy is considered as problematic for treatment of various types of cancers because many tumors relapses and develops resistances leading to multi drug resistance (Funk *et al.,* 2001). Anticancerous drugs used for cancer patients should explicit their possession on cancerous cells or tumorous cells but many chemotherapeutic drugs have several side effects such as baldness, suppression of immunity, revulsion, vomiting. Chemotherapy along with radiation or without radiation bulges to blood producing cells generating low blood corpuscle number (Napier *et al.,* 1999). Radiation therapy may induce diarrhoea (Nettleton 1995). Therefore, universal products derived from microorganisms, animals and plants should be taken under considerations. Apoptosis is equally important part of cancer remedy because several chemotherapeutic drugs are capable in inducing apoptosis thus preventing cancers (Wen *et al.,* 2003). Activation of apoptotic pathway is liable regarding anti tumorous property of any compound. The incidence of anticancer activity could promote the value of the seaweeds especially *C. decoricatum* as a food additive with improved nutritional properties (Dharmaraj Senthilkumar, Sivaraman Jayanthi., 2016).

The study aims at exploring the detailed view on several phytochemical compounds of seaweeds. The present study revealed about bioactive compounds having the anticancerous properties. The different procedures of extracting such bioactive compounds are also discussed. This investigation has revealed studies about algal anticancer agents and was concluded to discuss the glare of encouragement of recent investigation pertaining to the likely effects of bioactive components of algae on cancer.

Oceans-source of anticancerous drugs

The current epoch regarding research focuses on biologically active compounds with several health benefits from marine resources. These living effective constituents bulge towards products with anti-cancerous properties, anti-hypertensive properties, anti-oxidative properties etc. (Terasaki *et al.,* 2009) the marine resources deal with several breed of creature each with unique physicochemical properties biological properties. Till date, algae and microalgae are most common or renowned sources of reactive constituents utilising food additive (Whittaker *et al.,* 2000). The diverse environment is liable regarding the diversity in number of microorganisms and macro algae along with microalgae are target sources of bioactive compounds (Solomons *et al.,* 1994). Coastal algae such as seaweeds are widely used as traditional remedies. These aquatic algae are rich in bioactive compounds and also in minerals and vitamins (Polívka *et al.,* 2004). Bioactive compounds include substances like polysaccharides, proteins, phycocyanins, polyphenols, terpenes together with anti-inflammatory, anti-tumor, anti-cancerous properties (Zhang *et al.,* 1999). Algae comprises of diverse groups of organisms with different photosynthetic nature and different reproductive structures (Hurd *et al.,* 2014). Based on their size algae can be classified as unicellular microalgae and multicellular macro algae. Since algae resides in extreme habitat such as highly saline areas or under extreme light and temperature thus to adapt to these environment they release different varieties of secondary metabolites (Haugan *et al.,* 1994).

Seaweed is an inclusive designation for perceptible, multicellular and benthic aquatic algae that are found adhered to the bottom of shallow coastal waters, estuaries and in blackwaters on rocks, corals, pebbles (Pinto *et al.,* 2000).

Seaweeds are classified as Chlorophycae (green algae), Phaeophycae (brown algae), Rhodophycae (red algae). Green algae constitutes approximately 7000 diverse species ultimately giving rise to territorial plants(McHugh 1987).These algae posses chlorophyll a, chlorophyll b and carotenoids where starch acts as a storage food. 1500 species of brown algae are mostly aquatic and comprises seaweeds and kelps (Tseng 2001) .All brown algae present are multicellular and massive. Individual brown alga may grow to a length of 100 m with a holdfast, stipe and blade and are used in cosmetics and mostly ice creams[23] 4000 species of red algae are frequently navigational, minor as compared to brown algae and inhabits at an extent of 200 meters. They possess pigments such as chlorophyll a and c as well as phycobilins which are culpable for absorption of light that can permeate inside water and have cells enameled in carrageenan that are utilized as cosmetics, gelatin capsules and in some cheese (Lahaye *et al.,* 1997). Commercial importance of algae includes algae as source of food. Industrial uses include production of alginates, agar-agar, and carrageenan. Algae can also be used in antibiotics and medicines, nitrogen fixation. They are known as primary producers (Lahaye *et al.,* 1991).

Bioactive compounds-key for crystallization of anticancerous drugs Carotenoids

Carotenoids are most ample pigment of all photosynthetic organisms including algae, bacteria and plants (Hayashi *et al.,* 2004).These pigments may be green, red, orange, or yellow and are derived from isoprene units. Carotenoids are natural pigments that play a leading role in reaction centre of photo systems as it is liable for harvesting light during photosynthesis and compel free radical oxidation (Hayashi *et al.,* 2004). Red seaweeds is enriched with carotenoids such as α and β carotene, zeaxanthin, lutein whereas, brown algae has fucoxanthin, violanxanthin and β carotene as carotenoids. Green algae contain lutein, zeaxanthine, neoxanthine and β carotene (Hayashi *et al.,* 2004).

Fatty acids

Acids comprising methylene intermitted dual bonds were always recommended for normal cell functions. Fatty acids are of different varieties such as monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA). PUFAs have their prime importance in cellular metabolism and even in governance of laminal fluency, electron transit and thermal adoption (Dawczynski *et al.,* 2007). Some of fatty acids enact critical execution in plants and animals as predecessor against hormone like prostaglandins, leukotrienes (McHugh 2003).

Sterols

Sterols are major chemical constituents found in seaweeds. Mostly cholesterols are found that play considerable role in cell signalling and even in membrane fluidity. Red seaweeds are enriched with sterols such as desmosterol, cholesterol, sitosterol and fucosterol. Brown seaweeds encompass fucosterol frequently (Lee *et al.,* 2004).

Polysaccharide

Polysaccharides are polymer of monosaccharide or simple sugars having allied by glycosidic bond. Algae have polysaccharides as a major structural constituent of cell wall along with muco polysaccharides and storage polysaccharides. Some of the seaweeds with polysaccharide are *Ulva, Porphyra, Ascophyllum* (Amano *et al.,* 2005). The wall of cells having polysaccharide mainly consists of cellulose, hemicelluloses, pectins .Some of green seaweeds has sulphated galactans, sulphated polysaccharides whereas, brown seaweeds comprises of fucoidan, alginic acid, sulphated fucose. Red algae contain floridan starch and carrageenans (Jeon *et al.,* 2005).

Agar

Agar is mixture of agarose and agropectin and is mainly extracted from *Gelidium sp.* and *Gracilaria sp* (Chattopadhyay *et al.,* 2009). The commercial importance of agar includes textile printing dyes, adhesives, paper coating, culture media, anticoagulant, laxatives and tablets (Urbano *et al.,* 2002). The purified form of agar is agarose and is valuable in separation techniques (Rasmussen *et al.,* 2007).

Carageenans

Carageenans are water soluble sulphated galactans and since water soluble it can dissolve in water (Michel *et al.,* 1996) because they possess linear polysaccharides (Hemmingson *et al.,* 1996). They can be used against constipation and dysentery (Kamthania *et al.,* 2014). They are used in chocolates, deserts gels, ice-creams, jellies, jams etc (Zheng *et al.,* 2005). It may also be used against transmission of HIV virus, genital warts (Gonçalves *et al.,* 2002).

Alginate

Alginate consists of mannuroric along with guluronic acid residues. It mainly exists amongst brown algae that have its prime importance in pharmaceutical industry (Antonopoulos *et al.,* 2005) by the virtue of its chelating ability (Zhou *et al.,* 2004) Further, alginate can be recycled as dietary fibres (Sheng *et al.,* 2006) and is also used against hypertensive effects along with hypercholersteremia (Carlucci *et al.,* 1997).

Phycocolloids

Phycocolloids are polysaccharide of huge molar mass polymers (Shanmugam *et al.,* 2000) that forms the architectural constituent of wall (Witvrouw *et al.,* 1997) which is involved in quantifying the procedure among seaweed (Arasaki *et al.,* 1983).

Astaxanthin

Aataxanthin is a dietary compound abundantly found in nature such as in yeast, microalgae and salmon (Kim *et al.,* 2008).The major fame of astaxanthin lies in the fact that it antioxidant properties, antitumor activity as well as anti-inflammatory properties (Nishide *et al.,* 2001). Astaxanthin can even induce apoptosis by restraining PI3K/AKT, MAPK, Wnt/β-catennin signalling in cells (Wong *et al.,* 2000). It mediates its anti-carcinogenic property (Okazaki *et al.,* 1969) by inducting apoptosis (Panlasigui *et al.,* 2003) and inhibiting proliferation of cell (Potin *et al.,* 1999).

Fucoidan

It is a mode of sulphated polysaccharide which is mainly constituents of brown seaweed (Mayer *et al.,* 2008).

It comprises of D-glucose, uronic acids, L-fucose, D-mannose, D-xylulose, D-galactose and sulphate groups (Smit *et al.,* 2004). It is famous for their anti-cancerous, anti-inflammatory, anti-viral, anti-oxidant and anticoagulant properties (Damonte *et. al.*1994).

Bioactive anticancer pigments reported from algal source

A diversity of red algae has anti proliferative and anti-inflammatory activities. *In vivo* and *in vitro* studies on seaweed component have been administered to elucidate the anti- mutagenic process of underlying the potential anti-carcinogenic possessions of red algae against colon and breast cancers (Berge *et al.,* 2002).some of them are as follows: Polysaccharides.

Polysaccharides are extreme ample in the midst of the quality natural bioactive formed by plants and they are commonly found in algae. *Spirulina platensis consists of polysaccharide Calcium spirulina (Ca-SP)* that inhibited metastasis. It was reported that Spirulina polysaccharides restrain the glioma cell (murine RSV-M) growth via biased regulation of interleukin-17 (Parages *et al.,* 2012). Polysaccharide abstracted from *Porphyra yezoensis* is valuable in the cure of human cancers (Lu *et al.,* 2011). Polysaccharides abstracted from the brown algae, *Sargassum latifolium* comprises of momentous antitumor act adjacent to leukemias.

Fucoidans

Fucoidan comprises of anti-proliferative actions, even its supreme process is yet not known. Fucoidans are responsible for enhancing the immuno-modulatory action to suppress the development of tumour cells as they are mediators of the demolition of tumors by NK cell (Maruyama *et al.,* 2007).

Phycocyanin

The phycocyanin abstracted from *S.platensis* showed the anticancer potential adjacent to squamous cell carcinoma. C phycocyanins (C-PC) form the foremost biliproteins of *S. platensis* that comprises of radical scavenging potential (Reddy *et al.,* 2003).

Pheophytin

Pheophytin, abstracted from *E. prolifera* accounted for to exemplify the tough domineering force adjacent to synthetically affected mouse skin tumorigenesis (Athukorala *et al.,* 2006).

Glycoprotein

Glycoprotein abstracted from *Capsosiphon fulvescens*, compels apoptosis in human gastric tumor (AGS) cells (Kim *et al* 2006). Analysis of blue green growth revealed the antagonism to infection impacts of *Spirulina* recombinant glycoproteins (Hwang *et al.,* 2010)

Elatol

Elatol possess antitumor potential and diverse investigations established that *Laurencia microcladia* derived elatol decreases tumour growth in C57BL6 mice (Farooqi *et al.,* 2012).

Sargachromanol E

SE, chromene abstracted from *Sargassum siliquastrum* restrain HL-60 cells at an explicit concentration. The substance was moreover distinguished to force apoptosis by way of caspase 3 enactments (Kim *et al.,* 2011)

Stypodiol diacetate

14-keto-stypodiol diacetate is a medicine abstracted from Stypopodium *flabelliforme* and was verified to distress microtubular organization besides self-possessed cell progress in DU-145 human prostatic cells (Farooqi *et al.,* 2012).

Monoterpenes

Halogenated monoterpenes are formed by *Plocamium*, *Porteria* and *Ochtodes* algal species. Halogenated monoterpene, abstracted from *Portieria hornemannii*, comprises both bromine and chlorine groups were shown to possess elevated amount of cytotoxicity adjacent to brain, colon and kidney tumours (Afolayan *et al.,* 2009).

Properties of marine seaweed

Antibiotic activities

Antibiotic activities are those activities that prevent the bacterial growth (Nakashima *et al.,* 1987) ·Generally, macroalgae are proclaimed to have antibiotic activity (Wu *et al.,* 2012).

The chemical compounds depicting these antibiotic properties (Malhotra *et al.,* 2003) of algae include halogenated compounds like halogenated alcohol; alkanes, aldehyde, ketones etc (Sugawara *et al.,* 1989). Even sterols and phenolic compounds (Feldman *et al.,* 1999) are announced to have antibiotic property (Ponce *et al.,* 2003).

Anti-viral properties

The term "anti-viral" reveals that this property prevents growth of viruses (Lincoln *et al.,* 1991).Generally; sulphated polysaccharide plays a dominant role (Kjelleberg *et al.,* 2001) in depicting anti-viral properties against different viruses. Fucoidans in distinction to brown algae are also sometimes noticed to have anti-viral properties (Gerwick *et al.,* 1993)· Carageenan also has *in vitro* anti-viral properties (Jacobs *et al.,* 1993). A sulphated polysaccharide has been reported to have antiviral property against HIV reverse transcriptase *in vitro* (Colliec *et al.,*1991).The eminent molecular weight galactan prevents the attachment from host in *Gracilaria corticata* (Grauffel *et al.,* 1989).

Anti-cancerous activity

Colony formation in several strains of cancer is inhibited by sulphated polysaccharide such as fucoidan (Nishino *et al.,* 1991).Thus fucoidan can be termed as anti-tumor agent (Segneanu *et al.,* 2013) *Champia feldmanni* has an immune modulatory action that helps in increasing production of antibodies. It also comprises some anticancerous activity.

Anticoagulant activity

Fucoidans are proclaimed to have anticoagulant activity which is mediated with the help of heparin cofactor II or anti-thrombin III. The interaction between thrombin and fucan results in anti-coagulant activity which ultimately increases with increase in sulphate content.

Biomass extraction method

To determine very small amounts of biomass in the sample, array of steps is to be followed: abstraction (serration) regarding point biomass of sample grid,

serration and refinement of the object biomass from co-extracted, non-object biomass, biomass concentration. The different ways to abstract compounds/biomass includes liquid-liquid extraction, solid phase extraction, and solid phase micro extraction (Trusheva *et al.,* 2007).

Liquid-liquid extraction

In these liquid abstraction methods non-polar solvents may be used that are soluble in water to abstract the object compound/biomass from water utilising the miscibility of the object biomass in the solvent in comparison to water. The object constituent is mostly abstracted by utilising a liquid comprising polarity near to that of the object biomass. The other possibility of extracting partially volatile aggregate is by altering the characteristics of extracts. When the compounds to be extracted are miscible in water, salting-out skills are used in a way to enhance the rate of extraction. The addition of salt reduces dissolving capacity of the mixture along with dissolving capacity of object biomass. Generally, the process of extraction is obtained by mixing the water sample and solvent .Sometimes when huge bulk of moisturizer are established separation regarding the solvent from the aqueous phase appears problematic .At that instance, moisturizer dispersed by addition of little chunk of ethanol becomes competent.

Solid phase extraction

The principle behind this extraction is- constituents regarding significance be restrained over specific sorbent. The handling of this method can be done to expel the matrix interferences and then segregate with discriminatory enrichment one's object compounds. Solvent utilised is usually small. The adverse circumstances are-the recovery rate becomes affected by the liquid rate even if amount of solvent used is small it is mandatory to segregate suspended solid composition for sample containing suspended solids it is attainable to obtain breech in the chemical compound due to contamination, the most appropriate solid phase for the object constituent in a way to obtain stable and high recovery rate is to be selected (Trusheva *et al.,* 2007).

Solid phase micro extraction (SPME)

In need to abstract organic compounds this method is used where the fibrous needle coupling insulated alongside fused silica is drenched undeviating to liquefied extracts, resolved and disclosed to the headspace vapours regarding liquefied sample.

Natural abstraction methods

Soxhlet extraction

The natural constituents in solid samples are extricated from the matrix in present extraction by efficiently cleaning the solid accompanying elusive liquid in soxhlet extraction apparatus. This forms up frequently utilised skill regarding abstraction from elemental constituents from solid extracts, is utilised as abstraction rate in consideration of supercritical liquefied abstraction. The extraction solvent for poly aromatic hydrocarbons is done efficiently in benzene and sulphur-containing compounds are best extracted in acetone (Trusheva *et al.,* 2007).

Mechanical extraction

Agitation and exhilarating process of abstraction is obtained by placing samples in centrifuge package with organic liquid and agitating followed by separation of constituent extracts by centrifugation or filtration. Homogenization is the abstraction of non-polar constituents in biological samples is best accomplished by this method. The sample is provided with dehydrated sodium sulphate and then it is lyses in the existence of a non-polar solvent accompanying separation of extracts followed by differentiated and separated with the help of centrifugation (Trusheva *et al.,* 2007).

Ultrasonic extraction

This abstraction process utilises ultrasonic oscillation elucidating constituents with polar solvents in an ultrasonic bath. Frequently, it is utilised against chemical elicitation from solid constituents. These methods are usually time taking and requires large amount of solvents and even influence of temperature may degrade the biomass. Thus, some new methods should be used such as supercritical fluids, pressurized solvent extraction and microwave-assisted extraction ·Supercritical fluids are effectual separation method for extracting essential oils from plant sources.

The advantage of SFE is that it allows extraction without thermal denaturation. By this method of extraction flavouring compounds can also be easily extracted. Pressurized solvent extraction is also termed as accelerated solvent extraction that requires high pressure and high temperature for extraction. It is advantageous by virtue of its highly reproducible products obtained after extraction. Microwave-assisted extraction utilises microwaves for solvent extraction and therefore is advantageous because these waves have non-ionizing radiations that is used for heating solvents during extraction process due to which kinetics of extraction is increased. It is less toxic and is rapid extraction method (Trusheva *et al.,* 2007).

Analysis done for detection of several properties

Radical scavenging property

In need to detect anti-cancerous property following DPPH and Hydrogen peroxide, ABTS Inhibition assays have to be performed previously**.**

DPPH assay or 2-picryl-hydrazyl assay is absolutely radical scavenging assay. The antioxidant attribute regarding the sample extract was determined by relying on the lurking activity of the stable DPPH free radical 0.1mM solution of DPPH is to be made and approx 1ml from solution is to be combined to the extract at different concentrations and absorbance is noted down at 517 nm (Zorofchian *et al.,* 2014).

Hydrogen peroxide assay is also to determine free radical lurking of extract or sample. Peroxide solution made should be 10mM and should be created in phosphate buffered saline (0.1M, pH 7.4). 1ml of abstract in different concentrations is supplied to 2 ml of hydrogen peroxide solution. The absorbance is evaluated by UV Spectrophotometer against a suitable blank at 230nm after incubation time of 10 min at 37°C (Zorofchian *et al.,* 2014).

ABTS Inhibition assay or (2, 2'azino bis (3-ethylbenzothiazoline-6sulphonicacid) diammonium salt) radical cation decolourizing assay is another method of determination free radical scavenging. ABTS is to be prepared by blending 5 ml of 7 mM ABTS along 88 µL of 140 mM potassium per sulphate beneath twilight at normal warmth for 16 h. The absorbance at 734 nm was recorded after the dilution with 50% ethanol. The ABTS radical lurking activity can be calculated by blending 5 ml ABTS solution along 0.1 ml seaweed constituent at different concentrations.

Antibacterial property

The antibacterial characteristics of any strains can be assayed through Agar well diffusion protocol followed by Disc diffusion protocol. The minimal amounts from the extracts to restrain the microorganisms can also be determined by micro dilution method using plant fractions progressively diluted in sterile nutrient broth.

Agar-well diffusion method involves the Petri plates supplied with 20ml Muller Hinton medium are to be implanted with 24hr culture strains of bacteria. Wells should be created accompanying 20 µl of the extracts (ethanol) is to be supplemented. The plates are nurtured at 37°C. The antibacterial property is to be evaluated by scaling the diameter against restrained zone formed. A positive control is also mandatory to be checked (Zorofchian *et al.,* 2014).

Disc diffusion method involves Muller Hinton Agar plates are to be primed and the object microorganisms should be introduced with aid of spread plate method. Filter paper discs should be soaked along 15µl of the extract lodging to agar plates. We need to press down each disc to assure entire association amidst agar surface and should be spread evenly. The agar plates are to be nurtured at 37°C. After incubating 18 hrs, each plate should be assessed. The resultant realms from restrain will be circular. The diameters from realms of overall inhibition are to be scaled; chloramphenicol was taken as control.

Anti-fungal property

Anti-fungal property is frequently assayed by agar plug method. It can be assayed by restrainment from mycelial advancement of the fungi and is observed in form of realm of inhibition.

PDA plates are to be primed and spilled over petriplates. A fungal plug was allocated in the mid and then the aseptic discs is to be dipped into sample and also lodged in the plates. Nystatin is to be utilised against antifungal control. The effect is observed in crescent form of inhibition (Hernandez *et al.,* 2004).

Antioxidant property

In catalase assessment the homogenized part of the object samples is to be prepared in phosphate buffer (0.067M, pH 7.0) and the homogenized part is exploited for the assessment. The samples are then interpreted contrary to a control, containing the H_2 O_2 -phosphate buffer. 3 ml of H_2 O_2 -phosphate buffer is to be supplemented to the experiential cuvette, succeeded by the supplementation of 40µl enzyme extract and blended properly. The point stretch requisite against reduction in absorbance by 0.05 units is observed at 240nm. The enzyme solution constituting H_2 O_2 -free phosphate buffer is often taken as control. The enzyme unit is estimated as enzyme volume requisite to reduce the absorbance at 240nm in 0.05 units (Indira *et al.,* 2015).

Peroxidase assessment the extract from enzyme is to be primed by crumbling 1 g source in 60 mM Potassium phosphate buffer (pH 6.1). Supernatant is often obtained by centrifugation at 18000 g for 15 min at 4°C. Guaiacol peroxidase activity is calculated with help of spectrophotometer (1). The reaction mixture (2 ml) was comprised of 50 mM potassium phosphate, 0.3 mM hydrogen peroxide and 5mM guaiacol and 80µl extract of enzyme. The absorbance was measured at 470 nm.

Anti-cancerous property

MTT assay

The anticancerous property of any sample can be evaluated by assessment of cytotoxic activity in vitro against particular cancerous cell line. Cells are to be spread in 1ml of medium/well in 24-well plates. After nurturing for 48 hrs the cell might reach the assemblage. Cells need to be nurtured in the existence of several amounts of the extracts in 0.1% DMSO for 48h at 37°C.

After elimination of the extract and cleaning along phosphate-buffered saline (pH 7.4), 200µl/well of 0.5% MTT solution is to be supplemented. After incubating for 4 hrs, 0.04M HCl are supplemented. Viability against cells is evaluated in form of absorbance at 570nm.Amounts are taken and IC50 is to be estimated by the graph. The absorbance found in 570 nm can be estimated along UV-Spectrophotometer against blank (Indira *et al.,* 2015).

Green synthesis of nanoparticles from algal extract

Nanoparticles have their own technical properties which gives certain objections in medical field. These nanoparticles because of their miniature form differ in its morphological, biological and chemical attributes when correlated with its analogue (Sharma *et al.,* 2009). There are certain approaches for synthesis of nanoparticles such as laser ablation, microwave irradiation electrochemical method etc(Patel *et al.,* 2007).In order to reduce the cost of synthesis of nanoparticles and the potential hazards caused to the environment use (Saifuddin *et al.,* 2009) of marine organisms or extract is preferable approach for synthesis of nanoparticles and since this is an ecologically favourable approach of synthesis of nanoparticles thus called green synthesis (Prabakaran *et al.,* 2012). Development of new drug for the cure of certain contagious diseases can also be made possible by nanoparticles and antimicrobial potential of marine seaweeds can pave through it (Jain *et al.,* 2009). The potential antimicrobial activities of nanoparticles are highly impacted by the amplitude of particle (Shahverdi *et al.,* 2007).Nanoparticles also committed to have bactericidal activity by dispensation of silver ions (Sambhy *et al.,* 2006).

Conclusion

This review paper accords with all important aspects regarding to cancers. This paper deals with and reflects light on marine seaweeds and its importance. Most of the anti-cancerous drugs isolated worldwide are from marine seaweeds and natural sources. Bioactive compounds released from these seaweeds have been proved to have anti-cancerous property. It can be concluded that marine algae can form part of anti-cancerous drugs and may help in inhibition of

cancer by playing a vital aspect in inhibition of cell proliferation, cell maturation and also help in apoptosis of cells. Antioxidant characteristics of naval algae may inculcate from several kinds of pigments such as carotenoids, terpenoids, flavanoids etc. these antioxidative constituents may play a part of inhibition or suppression of oxidation process. Navigational bacteria frequently generate anticancerous item in form of mode of preserving correlations amongst epizootic habitat, restraining challenging creatures.

Thus, it is very important to include a vast knowledge about all seaweeds and the products produced by them which would lead to discovery of better anticancerous drug.

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