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Review Article

Systematic Review on Drugs from Marine Sources

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ABSTRACT

The survey predominantly centers around utilization of marine medications in drug readiness with an exceptional consideration on the excipients and related intensifies that are effectively utilized by the drug and corrective field. Close around 70% of the world's surface covered by sea water, investigation into the science of marine creatures is moderately neglected and addresses a huge asset for new prescriptions to battle significant illnesses, for example, disease, Helps or intestinal sickness and their utilization is stretched out to the field of excipients as well. This audit paper enrolls not many marine medications that can be effectively utilized in the field of drug store and their restorative significance especially as excipients and beauty care products.

INTRODUCTION

With 70% of the world's surface covered via ocean water, evaluation into the investigation of marine living animals is overall dismissed and addresses a monster asset for new meds to battle basic pollutions, for example, undermining improvement, Helps or gastrointestinal disease and their use is reached the field of excipients as well. The marine climate harbors different full scale and little regular components that have made brilliant metabolic capacities to guarantee their tirelessness in different and sabotaging locales, accomplishing the biosynthesis of various aide metabolites with unequivocal exercises. Two or

three these metabolites are high-respect business things for the prescription and cosmaceutical endeavors. The sign of this study is to move toward the utilization of marine solutions in drug store, with a surprising spotlight on the excipients and related raises that are really utilized by the prescription and healing field.1

FOOD FROM MARINE SOURCE:

An unquestionable perspective from early to continuous times presents the utilization of marine animal for food purposes and follows the ascent and progress of the critical preservation procedures. The critical open doors for extended supplies from marine resources for food have

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come from the extended tank-farming of marine natural substances. The responsibilities of marine natural elements as commonsense food trimmings are different.

Chlorella vulgaris:

Chlorella is a class of single cell green development having a spot with the phylum Chlorophyta. It is roundabout in shape, around 2 to 10 μm in distance across, and is without flagella. Chlorella contains the green photosynthetic shades chlorophyll and chloroplast. Chlorella vulgaris is for the most part showcased and used, basically as dietary upgrades for individuals and as animal feed added substances. It has been used as an elective prescription in the Far East since bygone eras and it is known as a regular food in the orient. It is comprehensively made and exhibited as a food supplement in various countries, including china, Japan, Europe disregarding not having grass status. 2-5

Spirulina:

Spirulina is a cyanobacterium which can be consumed by individuals and various animals. There are two species *Arthrospira platensis* and *Arthrospira maxima*. Spirulina is stacked with supplements that can seriously influence the body and frontal cortex. It can make energy out of light. Spirulina became renowned when NASA suggested that it might be occupied in space and consumed by space explorers. Dried Spirulina contains around 60% protein. It is a completed protein containing all central amino acids, but with diminished proportions of methionine, cysteine, and lysine when stood out from the proteins of meat, eggs, and milk. It isn't enduring, better than all around ordinary plant protein, similar to that from vegetables.

Cladosiphon okamuranus:

It is also known as mozuku. It is earthy colored ocean growth that is reaped from normal populaces in the more heat and humidity of the southern islands of Japan. It favors reef pads in

quiet water, albeit moderate water flow is expected to supply adequate supplements. Mozuku is a pitiful type of nourishment in practically every respect. The one interesting dietary advantage it has is its high vitamin K substance, which is useful for coagulating blood to forestall exorbitant dying. This can be helpful for individuals who need to recuperate from blood-diminishing meds like Warfarin. It is unimaginably significant for individuals taking blood-thinners to talk with their medical care suppliers prior to taking extra vitamin K, eating mozuku consistently, or taking mozuku-refined Fucoidan. Fucoidan got from mozuku has additionally been displayed to give gastric security in tests on mice; however this is an impact that has been recreated by numerous different types of Fucoidan as well.⁶

Microalgae:

microalgae are minuscule green growth, commonly found in freshwater and marine frameworks living in both the water section and residue. They are unicellular species which exist exclusively, or in chains or gatherings the fundamental carotenoids delivered by microalgae are β -carotene from *Dunaliella salina* and astaxanthin from *Haematococcus pluvialis*. B-carotene fills in as a fundamental supplement and has appeal in the market as wellbeing food. B-carotene is regularly utilized in sodas, cheeses and spread or margarines. 9, 10, 11

Pyropia columbina:

It has high mineral substance with medium worth of expected mineral openness, low phytic corrosive substance and great Na/K relationship. Additionally it has bioactive mixtures, which are great electron givers and could go about as cancer prevention agent. This reality and the high dietary fiber level make columbina a solid low-fat food.¹²

Ulva linza:

The seaweed *Enteromorpha linza* has long been used as a food source rich in natural bioactive compounds in various regions of the world. Based



on the high antioxidant activities of compounds in SEO, it can be used as a food additive, preservative and dietary supplement to control the deleterious effects of oxidative stress with increased nutritional values. 13

Fucoidan:

Fucoidan is a dietary fibre that benefits the body by doing more than just burning fatty lipids like cholesterol and triglycerides. It has a slew of research-driven health benefits as well. If we take an extract of fucoidan, we also gain the benefits that the seaweed itself provides. Though these benefits can vary depending on the type of seaweed extract that is chosen, most seaweed benefits are very positive though some species of seaweed and their extracts have some side effects that the consumer should be aware of before choosing a fucoidan product. 7,8

ANTI OXIDANTS FROM MARINE SOURCES:

Marine organisms are proven to be a potential source of inorganic and organic substances which probably benefits human health. Certain edible sea weeds contain significant quantities of lipids, proteins, vitamins, minerals etc which have activity like free radical scavenging and prevention of oxidative damage in living organisms. In the next session the antioxidant activity of some selected marine organisms are explained.

Dunaliella salina:

Dunaliella salina is a type of halophile green micro-algae especially found in sea salt fields. Known for its antioxidant activity because of its ability to create large amount of carotenoids, it is used in cosmetics and dietary supplements. *Dunaliella salina* is the main source for the natural β -carotene in the market. β -carotene is a strong antioxidant, scavenging potentially harmful oxy radicals, which are commonly associated with the induction of certain cancers and there is an inverse

relation between the consumption of certain carotenoids and the risk of cancer. 14, 15, 16

Haematococcus pluvialis:

It is freshwater species of Chlorophyta from the family Haematococcaceae. This species is well known for its high content of the strong antioxidant astaxanthin, which is important in aquaculture, and cosmetics. *Haematococcus pluvialis* has been identified as the organism which can accumulate the highest level of astaxanthin in nature. This carotenoid pigment is a potent radical scavenger and singlet oxygen quencher, with increasing amount of evidence suggesting that surpasses the antioxidant benefits of β -carotene, vitamin C and vitamin E. 17, 18

Microalgae:

This is microscopic algae, typically found in freshwater and marine systems living in both the water column and sediment. They are unicellular species which exist individually, or in chains or groups. A stronger antioxidant activity exhibited by methanolic micro algal crude extracts (from e.g. *Isochrysis galbana*, *Chlorella vulgaris*, *Nannochloropsis oculata*, *Tetraselmis tetraele*, *Chaetoceros calcitrans*) when compared with α -tocopherol, but lower than the synthetic antioxidant BHT. 19, 20, 21

Pyropia columbina:

Pyropia columbina has high mineral content with medium value of potential mineral accessibility (except for iron), low phytic acid content and good Na/K relationship. Also *P. columbina* has bioactive compounds, which are good electron donors and could act as antioxidant. 22,23

Fucoidan:

Fucoidan is a sulfated polysaccharide found mainly in various species of brown algae and brown seaweed such as mozuku, kombu, bladderwrack, wakame, and hijiki forms of fucoidan have also been found in animal species, including the sea cucumber. Fucoidan is used as an ingredient in some dietary supplement products.



Fucoidan is beneficial to the human body for a number of reasons. Some benefits such as the high amount of antioxidants and immune system boosting and modulating powers are helpful in preventing illnesses before they set in. 7,8

COLORING AGENTS FROM MARINE SOURCES:

One of the clearest and capturing normal for the marine organic entities is their variety. As a rule, every phylum has its own specific blend of shades and a singular tone. These regular colors can work on the productivity of light energy use of the marine life forms and safeguard them against sun based radiation and related impacts. Hence, marine living beings are perceived as a superb wellspring of regular colorants and nutraceutical and it is normal they will outperform artificial materials as well as other normal sources because of their supportability of creation and inexhaustible nature.

Astaxanthin:

Astaxanthin is a larger class of chemical compounds known as carotenoids and derived from a word meaning yellow leaves since yellow plant leaf pigments. Astaxanthin is a red variety typical to a couple of maritime living creatures including microalgae, seagrasses, shrimp, lobsters and fish like salmon and trout. Scavengers can't consolidate carotenoids once more and require astaxanthin in their eating routine to acquire the agreeable assortment for fish market affirmation. A couple of typical sources, for instance, the green development *Dunaliella salina* and *Spirulina maxima* or made β -carotene, canthaxanthin and astaxanthin have been used hence. 24, 25, 26

Dunaliella salina:

It has high carotenoid content in its saline environment. The higher the salinity, the greater the beta carotene concentration. This organism's saline requirements also make it easier to grow, because it has few natural competitors in the high-salt environment. Conditions are easily controlled for commercial production. Manipulation of

salinity and light conditions, and restriction of nutrients, can stimulate formation of more beta carotene. It is a halo tolerant microalga, naturally occurring in salted lakes, that is able to accumulate very large amounts of β -carotene, a valuable chemical mainly used as natural food coloring. 14, 15, 16

Microalgae:

Microalgae are microscopic algae, typically found in freshwater and marine systems living in both the water column and sediment. They are unicellular species which exist individually, or in chains or groups. The main carotenoids produced by microalgae are β -carotene from *Dunaliella salina* and astaxanthin from *Haematococcus pluvialis*. β -carotene serves as an essential nutrient and has high demand in the market as a natural food coloring agent. Microalgae can produce a wide range of colored pigments and therefore they are an interesting source of natural colorants. Unfortunately, the conditions favorable for the production of interesting pigments are usually unfavorable for growth, because the production is a response to stress 19, 20, 21

Phycocyanin:

Phycocyanin is a color protein complex from the light reaping phycobili protein family, alongside allophycocyanin and phycoerythrin. It is an adornment color to chlorophyll. All phycobili proteins are water dissolvable so they can't exist inside the layer like carotenoids. Rather phycobiliproteins total to shape groups that stick to the layer called phycobilisomes. Phycocyanin is a trademark light blue tone, engrossing orange and red light Phycocyanin colorants overall are non-poisonous and non-cancer-causing. Utilizations of phycocyanin in food sources incorporate the shading of aged milk items, frozen yogurts, biting gum, sodas, cocktails, treats, sweet cake enrichment, and milk shakes. 28, 29, 30

Spirulina:



Spirulina tone is extricated from blue green growth that happens normally in freshwater and marine territories. It has a long history as a food in numerous nations. It gives an honest to goodness variety choice for food sources and refreshments with next to no green or purple feelings. DDW offers a standard powder type of Spirulina as well as a fluid structure with upgraded dependability to light. The essential color in spirulina is a protein called phycocyanin. It grants a cyan, or dynamic blue, variety.

FILM FORMING AGENTS FROM MARINE SOURCES

Polysaccharide films are made from starch, alginate, cellulose ethers, chitosan, carrageenan, or pectins and impart hardness, crispness, compactness, thickening quality, viscosity, adhesiveness, and gel forming ability to a variety of films. These films because of the makeup of the polymer chains exhibit excellent gas permeability properties, resulting in desirable modified atmospheres that enhance the shelf life of the product without creating anaerobic conditions. Additionally, polysaccharide films and coatings can be used to extend the shelf-life of muscle foods by preventing dehydration, oxidative rancidity, and surface browning, but their hydrophilic nature makes them poor barriers for water vapour.³¹

Agar:

Agar is derived from the polysaccharide agarose, which forms the supporting structure in the cell walls of certain species of algae, and which is released on boiling. These algae are known as agarophytes and belong to the Rhodophyta (red algae) phylum. Agar is actually the resulting mixture of two components: the linear polysaccharide agarose and a heterogeneous mixture of smaller molecules called agarpectin.

Agar is a hydrophilic colloid consisting of a mixture of agarose and agarpectin that have the ability to form reversible gels simply by cooling a hot aqueous solution. Used extensively in

microbiological media to provide firmness, agar exhibits characteristics that make it useful for coating meats. It forms strong gels characterized by melting points far above the initial gelation temperature.. The influence of agar on the structure and the functional properties of emulsified edible films has been recently studied.^{32, 33}

Alginates:

Alginic acid also called algin or alginate is an anionic polysaccharide distributed widely in the cell walls of brown algae, where through binding with water it forms a viscous gum. Its colour ranges from white to yellowish-brown. It is sold in filamentous, granular or powdered forms. Alginates are derived from seaweeds and possess good film-forming properties that make them particularly useful in food applications. Alginate has a potential to form biopolymer film or coating component because of its unique colloidal properties, which include suspending, film forming, gel producing, and emulsion stabilizing thickening, stabilizing,. Desirable properties attributed to alginate films, include moisture retention, reduction in shrinkage improved product texture, juiciness, color, and odor of foods. Edible films prepared from alginates form strong films and exhibit poor water resistance because of their hydrophilic nature.^{34, 35}

Carrageenan:

Carrageenans or carrageenins are a family of linear sulphated polysaccharides that are extracted from red edible seaweeds. Carrageenan is water-soluble polymers with a linear chain of partially sulphated galactans, which present high potentiality as film-forming material. These sulphated polysaccharides are extracted from the cell walls of various red seaweeds. Carrageenan film formation includes a gelation mechanism during moderate drying, leading to a three-dimensional network formed by polysaccharide double helices and to a solid film after solvent evaporation.



Recently, carrageenan films were also found to be less opaque than those made of starch. 36, 37

Chitosan:

Chitosan is a linear polysaccharide composed of randomly distributed D-glucosamine and N-acetyl-D-glucosamine. It is made by treating shrimp and other crustacean shells with the alkali sodium hydroxide. Chitosan is an edible and biodegradable polymer derived from chitin, the major organic skeletal substance from crustacean shells. This is the second most abundant natural and non toxic polymer in nature after cellulose. Some desirable properties of chitosan are that it forms films without the addition of additives, exhibits good oxygen and carbon dioxide permeability, as well as excellent mechanical properties and antimicrobial activity against bacteria, yeasts, and molds. However, a major drawback of chitosan is its poor solubility in neutral solutions. The required degree of deacetylation to obtain a soluble product must be 80–85% or higher. Chitosan products are highly viscous, resembling natural gums. Chitosan can form transparent films to enhance the quality and extend the storage life of food products. Pure chitosan films are generally cohesive, compact and the film surface has a smooth contour without pores or cracks.³⁷

STABILISERS FROM MARINE SOURCES:

Marine organisms are nowadays widely used in the pharmaceutical industry for their specific activities like stabilising action on pharmaceutical products as well as food. These are proven to be the best option for stabilising effects as these are cheap and more effective.

Alginate:

Alginates go about as stabilizers in frozen yogurt, expansion of alginate decreases the development of ice gems during freezing, giving a smooth item. This is particularly significant when frozen yogurt mellow between the grocery store and the home cooler; without alginate or comparable stabilizer

the refrozen frozen yogurt grows huge ice gems, giving it a bothersome crunchy mouth feel. Alginate additionally diminishes the rate at which the frozen yogurt will liquefy. Lager consumers favor some froth on the highest point of a recently poured glass, and unfortunate froth prompts an emotional judgment that the brew is low quality. Expansion of an extremely low convergence of propylene glycol alginate will give steady, longer enduring lager froth.

Carageenan:

Carrageenans is family of linear sulphated polysaccharides that are extracted from red edible seaweeds. There are three main varieties of carrageenan, which differ in their degree of sulphation. Kappa carrageenan has one sulphate group per disaccharide. Iota carrageenan has two sulphates per disaccharide. Lambda carrageenan has three sulphates per disaccharide. As a stabilizer of ice cream replacing starch and carrageenan, sodium alginate can avoid of ice crystal and make the product tasty. It also applies to the mixed drinks, such as ice lolly, iced fruit juice and iced milk etc. When adding some into dairy products like refined cheese, canned cream and dry cheese, the final product will not stick to the package. Moreover, sodium alginate can keep the product fine and avoid of splitting open if it is used as a cover of mild food.^{36, 37}

GELLING AGENTS FROM MARINE SOURCES:

Polysaccharides are widely used in the food industry primarily as gelling and/or thickening agents. Many commercially used polysaccharides like agar, alginates and carageenan are extracted from microalgae.

Agar:

Agar can be utilized as a purgative, a hunger suppressant, vegan substitute for gelatin, a thickener for soups, in natural product jelly, frozen yogurt, and different pastries, as an explaining specialist in fermenting, and for measuring paper



and textures. The gelling specialist in agar is an unbranched polysaccharide acquired from the cell walls of certain types of red green growth, basically from the genera gelidium and gracilaria for business purposes it is gotten essentially from gelidium amansii. In compound terms, agar is a polymer comprised of subunits of the sugar galactose. A few food sources will forestall gelling. New kiwi is excessively acidic and pineapple, new figs, paw paws, papaya, mango and peaches contain compounds, what separate the gelling skill of the agar. Cooked organic product appears to lose this impact. Chocolate and spinach additionally preclude gelling.^{32, 33}

Carrageenan:

They are generally utilized in the food business, for their gelling, thickening, and balancing out properties. Their fundamental application is in dairy and meat items, because of their solid restricting to food proteins. Carrageenan, a coagulated hydrocolloid extricated from the cell mass of marine green growth chondrus crispus, goes about as a gelling substitute for agar in bacteriological media, particularly the k salt of carrageenan Substrates. A mix of kappa-carrageenan and gelatin has likewise been found to help the co-immobilization of vigorous and anaerobic bacteria.^{34, 35}

Alginate:

The thickening property of alginate is useful in sauces and in syrups and toppings for ice cream. By thickening pie fillings with alginate, softening of the pastry by liquid from the filling is reduced. Addition of alginate can make icings non-sticky and allow the baked goods to be covered with plastic wrap. Water-in-oil emulsions such as mayonnaise and salad dressings are less likely to separate into their original oil and water phases if thickened with alginate. Sodium alginate is not useful when the emulsion is acidic, because insoluble alginic acid forms; for these applications propylene glycol alginate (PGA) is used since this

is stable in mild acid conditions. Alginate improves the texture, body and sheen of yoghurt, but PGA is also used in the stabilization of milk proteins under acidic conditions, as found in some yoghurts. Some fruit drinks have fruit pulp added and it is preferable to keep this in suspension; addition of sodium alginate, or PGA in acidic conditions, can prevent sedimentation of the pulp. In chocolate milk, the cocoa can be kept in suspension by an alginate/phosphate mixture, although in this application it faces strong competition from carrageenan. Small amounts of alginate can thicken and stabilize whipped cream.^{34, 35}

COSMACEUTICALS FROM MARINE SOURCE

Gorgonians

Gorgonians are otherwise called ocean whips and ocean fans and are like the ocean pen, a delicate coral. Gorgonians are firmly related to coral. Individual minuscule polyps structure settlements that are typically erect, smoothed, stretching, and suggestive of a fan. Others might be whiplike, rugged, or in any event, encrusting. Gorgonians are utilized in antiwrinkle cream.³⁸

Corals and mollusks:

Corals are marine spineless creatures in the class Anthozoa of phylum Cnidaria. They commonly live in reduced settlements of numerous indistinguishable individual polyps. The gathering incorporates the significant reef manufacturers that possess tropical seas and discharge calcium carbonate to frame a hard skeleton. Mollusks make huge phylum out of invertebrate creatures known as the Mollusca. Around 85,000 surviving types of molluscs are perceived. Molluscs are the biggest marine phylum, including around 23% of the multitude of named marine organic entities. Various molluscs likewise live in freshwater and earthbound environments. Corals and molluscs are utilized in neutraceutical preparations.³⁹

Alginates:



In the past dental impression material principally utilized by the combination of elastic and mortar. As of late it has been supplanted by Sodium Alginate material. Postulations material works effectively and the characteristics of printing precisely. Sodium Alginate material and Coagulant stuffed seperately. While utilizing, blend them in with water, them a couple of moments after a coagulum will appear. 36-40

CONCLUSION

Marine items seem to fit the standards for improvement as useful food fixings, drug exceptints and neutraceuticals. They, first and

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