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Chinese Herb Polysaccharides

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Abstract

The majority of traditional Chinese medicine components are derived from herbal plants. The medicinal quality of herbal plants varies according to growing area, herb collection portions, herb collection season, and herb processing procedure. Polysaccharides are important components of herb plants, and their manufacture is governed by the availability of nourishment and dictated by a variety of environmental conditions. Polysaccharides extracted from various Chinese herbs have attracted a lot of interest in recent decades due to their key biological activities such as anti-tumor, anti-oxidant, anti-diabetic, radiation protection, antiviral, hypolipidemic, and immunomodulatory properties. Surprisingly, various batches of the same plant can yield polysaccharide fractions with modest changes in molecular weight, monosaccharide content, glycosidic connections, and biological activities. Despite these differences, a vast variety of bioactive polysaccharides derived from various types of traditional Chinese herbs have been purified, characterised, and published. This study gives in-depth look at the most recent polysaccharide extraction methods as well as the methodologies employed for monosaccharide compositional analysis and polysaccharide structure characterisation. Most importantly, the chemical properties and biological activities of polysaccharides derived from well-known traditional Chinese herbs such as Astragalus membranaceus, Ginseng, Lycium barbarum, Angelica sinensis, Cordyceps sinensis, and Ophiopogon japonicas has been discussed. The published findings show that polysaccharides derived from traditional Chinese herbs play an essential role in their medicinal uses, laying the groundwork for future study, development, and implementation of these polysaccharides as functional foods and therapies in contemporary medicine.

Keywords: Biological activity; Chemical structure; Extraction method; Polysaccharides; Traditional chinese herbs

Introduction

The majority of the ingredients in traditional Chinese medicine come from herbal plants. The growing sites, the sections of the plants that are harvested, the time of year that the plants are harvested, and the method used to process the herbs all affect how medicinally effective a plant is. The manufacture of polysaccharides, which are important parts of herb plants, is largely impacted by the availability of nourishment and by other environmental conditions. It is somewhat regulated by genes. Due to their significant biological effects, such as anti-tumor, anti-oxidant, anti-diabetic, radiation-protective, antiviral, hypolipidemic, and immunomodulatory activity, polysaccharides extracted from many kinds of Chinese herbs have attracted a lot of attention in recent years. It's interesting to note that various batches of the same herb can produce distinct polysaccharide fractions with tinier variations in their molecular weights, monosaccharide compositions, glycosidic linkages, and biological activities. Despite these variances, numerous bioactive polysaccharides have been isolated, characterised, and reported from various traditional Chinese medicines. The most recent techniques for extracting polysaccharides, as well as those for analysing the composition of monosaccharides and characterising polysaccharide structures, are all thoroughly summarised in this review. Most importantly, the reviewed and discussed polysaccharides from well-known traditional Chinese herbs like Astragalus membranaceus, Ginseng, Lycium barbarum, Angelica sinensis, Cordyceps sinensis, and Ophiopogon japonicus will be reviewed for their reported chemical properties and biological activities. The published studies show that traditional Chinese herb polysaccharides are crucial to their medicinal uses, which lays the groundwork for further study, development, and use of these polysaccharides as functional foods and treatments in contemporary medicine. The most prevalent carbohydrates in diet are polysaccharides, often known as polycarbohydrates. They are long-chain polymeric carbohydrates made up of monosaccharide molecules linked by glycosidic bonds. Using amylase enzymes as a catalyst, this carbohydrate can react with water (hydrolysis), releasing its component sugars (monosaccharides or oligosaccharides). They come in a variety of shapes, from straight to heavily branching. Examples include structural polysaccharides like cellulose and chitin as well as storage polysaccharides like starch, glycogen, and galactogen [1-5].

With template-based accuracy, biological information moves from DNA to RNA to protein. The structure of cells, tissues, and organs, as well as the pathophysiological and physiological processes, cannot be fully explained by a thorough understanding of the information contained in DNAs, RNAs, and proteins because the environment controls the supply of food and the removal of waste to maintain the life of the organisms. Additionally, living organisms continuously produce and metabolise polysaccharides/glycans and lipids by the coordinated action of at least hundreds of proteins from inorganic elements and small organic molecules. Furthermore, compared to proteins, nucleic acids, and lipids combined, polysaccharides are heterogeneous macromolecules that carry a significantly higher level of structural information. All life systems, including those of animals, plants, fungi, and microorganisms, can use this paradigm. In all living things, polysaccharides are thus well-positioned to fulfil crucial energetic, structural, and biological roles. Sometimes quite diverse, recurring unit variations can be seen in polysaccharides. These macromolecules' characteristics can differ from those of their monosaccharide building units depending on the structure. They might even be water insoluble or amorphous.

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Homopolysaccharides or homoglycans are polysaccharides in which all of the monosaccharides are of the same type; heteropolysaccharides or heteroglycans are polysaccharides in which more than one type of monosaccharide is present.

Discussion

Polysaccharides are the most prevalent natural biopolymer and have special chemical, physical, and biological characteristics. The backbone of these polymers is made up of monosaccharide building units and glycosidic connections, which also define the variety and complexity of the polysaccharides. The chemistry of carbohydrates, methods for creating specific oligosaccharides, and characteristics and uses of a number of significant polysaccharides are all covered in this chapter. We will discuss enzymatic, chemical, and chemoenzymatic methods that provide access to well-defined polysaccharides. These developments continue to enable an increasing variety of fascinating polysaccharide-based biomedical applications in research and business. Similar to this, kinetics may be a significant factor in the dissolution of polysaccharides, which dissolve very slowly due to the characteristics of the matrix from which they must be released. Accordingly, depending on the time frame used for observations, polysaccharides may appear to be insoluble or to have low solubility. With the exception of a few modified celluloses, dietary polysaccharides typically become more soluble and dissolve more quickly as temperature rises [6-10].

In order to increase the immunogenicity of the antigens in vaccines, an adjuvant is a material that is added. In populations that do not respond well to vaccination, adjuvant can produce higher immune responses, reduce vaccine dosage, and lower the cost of production. Aluminium salts, oil emulsions, saponins, immune-stimulating complexes, liposomes, microparticles, nonionic block copolymers, polysaccharides, cytokines, and bacterial derivatives are the main types of adjuvants under development or currently in use. Due to the inherent immunomodulating, biocompatibility, biodegradability, low toxicity, and safety properties of natural polysaccharides, polysaccharide adjuvants have received a lot of interest in the development of nano vaccines and nano medicines. The effects of humoral, cellular, and mucosal immunities can all be enhanced by a range of natural polysaccharides, which have been shown to have better immune-promoting properties. The newest research on polysaccharides with vaccine adjuvant properties, such as chitosan-based nanoparticles (NPs), glucan, mannose, inulin polysaccharide, and Chinese medicinal herb polysaccharide, was thoroughly reviewed in the current work. The use of polysaccharides as adjuvants and their prospects for the future were also covered. These results establish the groundwork for future advancements in polysaccharide adjuvant technology. With more in-depth research into polysaccharide adjuvants, more of these adjuvants will be created and employed extensively in clinical practise.

Polysaccharides are composed of either two alternating tiny units of the same type or one type of small unit other than informative molecules like protein and nucleic acids. Polysaccharides used in glycoscience (polysaccharides) conduct a wide range of biological functions and are used in numerous medical applications. Heparin, a sulfated polysaccharide, is crucial for blood coagulation. Hyaluronan, a polysaccharide, lubricates human joints. It has been applied during ophthalmologic surgery to safeguard the corneal endothelium. Numerous biological processes, such as the identification of cells, adhesion, control of cell development, cancer spread, and inflammation, rely on cell surface polysaccharides. Additionally, polysaccharides are used as attachment sites for pathogenic bacteria, viruses, hormones, and poisons. For the analysis of interactions based on carbohydrates, synthetic polysaccharide derivatives are crucial tools. Macromolecular polysaccharides, along with other naturally occurring and artificial polymers, have the potential to be used as high molecular weight carriers for a variety of therapeutically active substances.

Conclusion

Additionally, harmful bacteria, viruses, hormones, and toxins adhere to polysaccharides as attachment sites. Synthetic polysaccharide derivatives are essential resources for the research of interactions based on carbohydrates. Macromolecular polysaccharides have the potential to be employed as high molecular weight carriers for a variety of therapeutically active compounds, along with other naturally occurring and synthetic polymers. The majority of the sources of the carbohydrates in the human diet are plants, and they are essential for food processing, diet, and health. Despite being largely thought of as sources of energy, they also have additional effects on diet and health, particularly the polysaccharides found in cell walls, which make up the majority of dietary fibre. It is becoming increasingly obvious that dietary fibre and resistant starches both help lower risk factors for chronic illnesses like cardiovascular disease and several cancers.

References

1. Zehr BE, Eckhoft SR, Singh SIC, Keeling PL (1995) Comparison of wet milling properties among maize inbred lines and their hybrids. Cereal Chem 72: 491-497.
2. Wijesinghe JAAC, Wickramasinghe I, Saranandha K (2015) Kithul Flour (Caryota urens) as a Potential Flour Source for Food Industry. Am J Food Technol 3: 10-18.
3. Toole BP (2001) Hyaluronan in morphogenesis. Semin Cell Dev Biol 12:79-87.
4. Allison D, Grande-Allen K (2006) Hyaluronan: a powerful tissue engineering tool. Biomaterials 12:2131-2140.
5. Philip JM, Mahalakshmi K (2019) Antimicrobial effect of three Indian medicinal plant extracts on common denture plaque bacteria. Drug Discov Today 11(3): 584-586.
6. Geetha S, Vasuki R (2019) Anticancer activity of Cissus quadrangularis. Int J Eng Innov Technol 8: 603- 605.
7. Anbuselvi S, Roshini Esther A, Punithavathy R (2019) In-vitro anti-urolithiatic activity of Theriophonum minutum and Remusatia vivipara. Int J Recent Technol Eng 8: 3088-3091.
8. Leung DYC, Wu X, Leung MKH (2010) A reviews on biodiesel production using catalyzed Tran's esterification. Appl Energy 87: 1083-1095.
9. Meher LC, Sagar DV, Naik SN (2006) Technical aspects of biodiesel production by Tran's esterification - A review. Renew Sustain Energy Rev 10: 248-268.
10. Anamika G, Saumya D, Mazumder A (2021) Updated Review on Ethno medicinal Plant Caryota urens. Int J Pharm Res 13: 101-105.