

REVIEW

Open Access



Review on the "Biological Applications of Okra Polysaccharides and Prospective Research"

Ali A. A. Al-Shawari¹ , Mustafa F. Harneed², Kawkab A. Husseini¹ , and Hanan E. Thawani^{1,3}

Abstract

Background: vegetables with edible parts like flowers, fruits, stems, leaves, fibers, roots, and seeds are rich sources of essential vitamins, minerals, and fatty acids with various medicinal functions. Many diseases such as osteoporosis, diabetes, high cholesterol, obesity, heart diseases, and stroke are caused by poor healthy lifestyle or nutrition. Therefore, generation of new biological functions from vegetables will increase the interests of scientific research and applications.

Main body: Okra is an edible vegetable which contains vitamins, fiber, carbohydrates, protein, and minerals. The bioactive compounds of okra possess various biological activities such as anti-inflammation, antibacterial, anticancer, and antidiabetic. Polysaccharides from vegetables or medicinal plants are important large molecules with various biological applications. In this review, we will focus on the biological properties and nanoparticle uses of polysaccharides isolated from okra and the extraction methods of polysaccharides.

Conclusion: This review will enhance the scientific research findings of okra polysaccharides and recommend future perspectives of polysaccharides for biological uses.

Keywords: Antioxidant, Antibacterial, Extraction methods, Edible vegetables, Nanoparticles of polysaccharides, Okra, polysaccharide

Background

Edible plants are one of the important sources of proteins, carbohydrates, vitamins, amino acids, minerals, and lipids that enhance the immune system, bones, muscles, and other parts of the human body to fight diseases [1, 2]. Edible vegetables have common benefits for the human body and animals due to the chemical components of primary metabolism, which depends on the type of soil, used water, and environment changes [3–4].

Okra is one of the delicious edible vegetable in North America, West Africa, South Asia, and Arab countries; it has few common names like lady fingers (English-speaking countries), Benya (common name in Iraq), and father of

musk (some Arabic countries) [5]. Okra belongs to the Malvaceae family, genus *Abelmoschus*, species *esculentus* and contains edible green seeds, pods, and fibers (Fig. 1) [6].

Fresh okra contains energy, 90% water, 7% carbohydrates, 2% protein, fibers (contains alpha-cellulose, hemi-cellulose, lignin, pectin, fat, and wax matter), some important soluble vitamins in water and fat, and minerals like calcium, iron, magnesium, phosphorus, potassium, and zinc [7, 8]. Therefore, okra is an important edible vegetable for human health. Okra mucilage is used in industrial as turbidity from wastewater [9, 10], and also under investigations as biodegradable food packaging [11, 12]. The biological studies of okra bioactive compounds were investigated as antioxidant, neuroprotective, anti-diabetic, anti-hyperlipidemia, and anti-fatigue activities [13]. Okra polysaccharides have not yet pharmacology

*Correspondence: ali.alshawari@hafran.edu.sa; ali.alshawari@chemistry.sci.uob.edu.sa
Chemistry Department, College of Education for Girls, University of Basrah, Basrah, Iraq.
Full list of author information is available at the end of the article