Tailor-Made Polysaccharides in Biomedical Applications

Edited by
Amit Kumar Nayak
Md Saquib Hasnain
Tejraj M. Aminabhavi

Chapter 2

Etherified polysaccharides in biomedical applications

Pritish Kumar Panda, Amit Verma, Sanjay K. Jain*

Pharmaceutics Research Projects Laboratory, Department of Pharmaceutical Sciences, Dr. Harisingh Gour Central University, Sagar, Madhya Pradesh, India

*Corresponding author

2.1 Introduction

Polysaccharides have been recognized and applied as promising candidates for diverse biomedical and biotechnological applications. These natural polymers possess unique characteristics because of their identified chemical structures. They also bear the vital qualities such as abundance, renewable nature, biocompatibility, biodegradability, lack of toxicity, and relatively low cost, which endorse its application in biomedical and pharmaceutical purposes [1-5]. The increasing demand for the development of diversified biomaterials in the sector of nanomedicine has imposed modifications in the structure of these polymers to bring novel properties [6,7]. And these alterations widen the spectrum of applications that lead to enhance their values. The presence of some of the principal chemical moieties/functional groups such as hydroxyl group, and for some polysaccharides of the amine or carboxylic groups makes them promising for the development of distinctive organic reactions such as etherification, esterification, amidation, carboxymethylation, oxidation condensation with carbonyl compounds, etc., but also the synthesis of grafted or block copolymers that significantly alter the water-soluble natural polysaccharide to hydrophobic nature and form modified compounds with novel properties. The common etherification reactions that occur generally with the polysaccharides are depicted in Fig. 2.1. These modified polysaccharides help to make several micro/nanoparticulate systems that exhibit many biomedical utility such as the prevention, and treatment, of diseases, where the mere classical drug has not displayed much efficacy. This chapter aims to review the possibilities of chemical modification using etherification reactions of some typical polysaccharides: cellulose, starch, alginates, chitosan, dextran, gellan gum, locust bean gum (LBG), and pullulan to make suitable materials for pharmaceutical and biomedical applications [8]. The sources and biomedical applications of some of the etherified polysaccharides are depicted in Table 2.1.

Tailor-Made Polysaccharides in Biomedical Applications. DOI: 10.1016/C2019-0-02837-3