10.8 Biomedical Application of Alginates

There is immense requirement of alginate-based biomaterials in the field of regeneration and drug delivery. Especially, stem cells have more important function in the field of regenerative remedy [78, 79], and the mixture and relations involving stem cells and alginate-based materials have been distinctively emphasized. Both cytotoxicity assay (*in vitro*) and implantation (*in vitro*) have shown that microcapsules and scaffolds (alginate-based) revealed minimal or negligible cytotoxicity and are histocompatible [80–82]. For increasing hematoma-like crack repair, these *in vitro* consequences recommended tunable interactions between the biocomposites and the multiple platelet releasate-derived bioagents. Furthermore, for *in situ* curing of implant systems, modestly invasive liberation was established in rat tail vertebrae via vaccination by means of microcomputed tomography. These consequences confirmed that alginate-based scaffolds were capable to mortify, permitted vascularization, and elicited little inflammatory reactions following transplantation. Thus, alginate-based scaffolds can give suitable characteristics like potential cell and medicine carriers for tissue regeneration. Important functions of alginate in pharmaceutics include the following: stabilizing agents and they help in gel making and thickening, because alginate can play an important function in restricted discharge drug products. Although oral dose forms are presently the most common use of alginate in pharmaceutical applications, the use of alginate hydrogels like depots for tissue localized drug delivery is rising. At this juncture, we briefly explain fresh development in biomedical function of alginate and/or its derivatives.

10.8.1 Controlled Chemical and Protein Drug Delivery

For the delivery of many small molecular weight drugs, alginate gels have been checked. The bond (primary or secondary) between the drug and the alginate was used for the kinetics regulation of drug release. Alginate gels usually have pore sizes in the nanometer range (~5 nm) [83], which leads to quick diffusion of minute molecules via the gel; for instance, the release of flurbiprofen from ionically cross-linked alginate gels (partially oxidized) is approximately complete in 1.5 h. On the other hand, assimilation into beads created using alginate gels (partially oxidized) in the occurrence of both adipic acid (dihydrazide) and calcium ions (mixture of ionic and covalent cross-linking) leads to an extended release because of the amplified quantity of cross-links and consequently decreased inflammation [84]. By using partially oxidized alginate gels, the release of antineoplastic agents