3.7 Future Perspectives

There will be the option of making three-dimensional cell culture systems. The synthetic and natural polymers, their derivatives, and composites can be used for making a 3-D culture system. The properties of alginate to make this type of system involve mechanical strength, the ability of gel formation, and also the way of interaction to react with the cell. Alginate poses the property of giving support to the immobilized cell, which makes it compatible and processed at room temperature. Because of this, the material is the best option for tissue and cell culture and therefore for 3-D system also. Proliferation, differentiation, and cell attachment can be favored by this 3-D culture system because it possesses alginate microporous scaffolds in dried form and is ionically gelled. This will help to convert scaffolds into hydrogels.

The alginates can be used in the microparticle forms for therapeutic purposes. The common method used in tissue engineering is that living cells are immobilized. Immobilization should be done under mild conditions and when cells are compatible. Encapsulation is the best approach made in the treatment of neurodegenerative tissues and diabetic diseases using alginate. This system is very selective and protects the encapsulated cells. In case of Parkinson's disease, the NT cell is encapsulated to recover and regenerate damaged tissues. It can also be used in the case of animals, where brain implantation can be done into the impaired site. These NT cells have the ability to produce nerve growth factors and cerebrospinal fluid. Also other serious diseases like Alzheimer and neuronal diseases can be cured or improved up to some extent by this method of treatment.

The biological activity of alginate oligosaccharides is another approach. These alginate oligosaccharides also act as postbiotic and prebiotic. This is because the material can promote the *Bifidobacterium* species growth, and at the same time, it reduces or inhibits the colonization of *Salmonella enteritidis* present in the intestine [22].

Immobilization is the technique used for large amounts nowadays. In pharmaceutical industries, food industries, agricultural production, environmental protection, and drug development, immobilization is the best approach. In case of the coating technique involving immobilization of coating, alginate gel still has some problems. Thus, future interest should be toward the modification and development of coating materials for alginate capsules, so that they will remain more viable and effective. For this, the studies should be done on encapsulation, metabolic activities, metabolism, genomics, transcription, and modern technologies. The way should