ABSTRACT
Development of 3-D Axially Aligned Nanostructured Fibrous Scaffold for Small Diameter Cardiovascular Tissue Engineering
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Cardiovascular disease ranks top in developing and developed countries by consuming human life in colossal. Though, the synthetic grafts such as PTFE and Dacron are commercially available for larger diameter blood vessels they are not suitable for the smaller diameter blood vessels due to the variations in the size and functions. Development of synthetic small diameter vascular grafts is in high plea with the engineered geometry and functional aids for revascularization owing to the failure of autografts, allografts and xenografts in small diameter blood vessels. At primary level, development of synthetic vascular grafts is an attempt to reproduce the fibrous Extra Cellular Matrix (ECM) present in native micro environment for the betterment of cellular activities and to develop a multifunctional ability by replacing the ailing tissues.

Synthetic vascular grafts were found not to be just as a structural abet; but also has major role to play in cellular fate like adhesion, proliferation, migration, and differentiation by means of cell-matrix interaction and intercellular communications. Based on the physicochemical properties and structure of biomaterial configuration synthetic vascular grafts properties like mechanical strength, porosity, thrombo resistivity, endothelization were influenced. Progress in designing a defined native
mimicking geometry of the grafts with all the above said properties and characteristic features are a challenging task.

Thus, major effort has been taken to address these challenges by developing 3D axially aligned nanofibrous small diameter graft using biocompatible and biodegradable polymeric physical blends of aliphatic polyesters. The approach implemented in this study is fabrication of 3D axially aligned nanofibrous graft with the aid of electrospinning. Later, the same were characterized for their physicochemical and biological properties. Further in vitro studies were carried out to evaluate the ability of hemocompatibility, thromboresistivity, and endothelial cell adhesion, proliferation, viability and key gene expression for vascular tissue regeneration.