Preface

An injury to human body due to violence, accident, or surgery, which typically includes cut or breaking the skin, and often extending into subcutaneous tissue with damage to other inner structures are categorized into wound. Depending on the depth of the skin layer, a wound can be either confined to epidermal layer or loss of both epidermis and dermis, i.e., full thickness wounds (FTW). Due to high rate of occurrence, the wound has caused the immense social and economic impact worldwide. As per a 2018 retrospective analysis, around 8.2 million people had at least one type of wounds with or without infections. The estimated cost for the treatment of acute and chronic wound ranged from $28.1 billion to $96.8 billion.

Usually, a skin itself repairs the wound, however an open full thickness wound with considerable loss of tissue and distant edges does not heal in predicted time and require a tissue regeneration scaffold. Secondly, an open wound is also highly prone to microbial infection led degeneration of extracellular matrix (ECM). Further, excessive production of reactive oxygen species for phagocytosis of microbes also activates the matrix metalloproteases which degrade ECM.

Therefore, in the view of mentioned problems faced by an open wound, the objective of current study was to develop a biodegradable and biocompatible nanofiber membrane loaded with an antimicrobial and an anti-oxidant for application at wound site to achieve accelerated wound healing.

Various properties of an electrospun nanofibers such as high surface to volume ratio, functional and structural similarity with native ECM, protection of wound from microbial infiltration, and as drug delivery device with controlled and sustained release profile, make it a potential candidate for wound dressing. Further, topical application of ciprofloxacin hydrochloride (CH) will reduce the dose and related systemic side effect. Similarily, physico-chemical & pharmacokinetic problems of quercetin (Que) such as poor water solubility, low bioavailability, short half-life, physiochemical instability when exposed to the gastrointestinal environment can be reduced by topical administration.

The entire research work has been carried out systematically in three steps. First; CH and Que loaded poly (ε-caprolactone) nanofibers (PCL-CH-Que), second; CH and Que loaded PCL-GE based nanofibers (PCL-GE-CH-Que) and lastly; CH and Que loaded poly (D,L-lactide-co-glycolide) based nanofiber (PLGA-GE-CH-Que) were prepared and extensively evaluated for various *in-vitro* and *in-vivo* characterization, and the results were discussed and compared profoundly.

Conclusively, this study endorses the use of PCL, PCL-GE and PLGA-GE based nanofiber loaded with ciprofloxacin hydrochloride and quercetin as better wound healing dressing material.