12. CONCLUSION

Polychaetes are multi-segmented most abundant and diverse group of Phylum Annelida (segmented worms, with over 16,500 recognized species), including more than 13,000 described species in more than 80 families. The polychaetes play an important role in the ecology both as consumers of plankton and as food for many bottom feeding fin and shellfishes. They provide key linkages between primary producers and higher trophic levels in the marine food chains. The high level of adaptability allows these worms to be easily cultured and is responsible for its characterization as a good experimental animal. Most taxonomic identification methods rely heavily on morphological characters. Studies on morphological structures to assign taxonomic identifications can be tedious and can lead to misidentification in cryptic species, and the morphology of most of the species can be described in detail in the adult stages only. Moreover, histological anomalies may also affect morphological identification.

Molecular tools have revolutionized the exploration of biodiversity, especially in organisms for which traditional taxonomy is difficult. In the present the polychaete samples were collected from the intertidal region of the Vellar estuary, Parangipettai, Tamil Nadu and subjected for molecular identification based on COI, 18S and ITS genes. The collected polychaetes were also assessed for its potential biomedical applications in terms of synthesis of silver nanoparticle and insilico analysis of polychaete derived fatty acids.

The isolation of pure, intact, and high-quality DNA is very crucial for any molecular studies. Bearing this in mind the study was started with the optimization
and evaluation of the already extracting DNA extraction protocol. As a result a
standardized DNA extraction is proposed in the present study exclusively for
marine invertebrates in particular polychaete taxon. The extracted DNA by the
standardized method is amenable to RAPD and amplification of COI, 18S and ITS
gene. 14 Polychaete species belonging to eight families were successfully
amplified using mitochondrial cytochrome oxidase subunit I gene with universal
primers \textit{LCO1490} and \textit{HCO2198}. The nucleotide diversity in COI gene sequences
was found satisfactory to discriminate all the species of Polychaete, which was in
accordance with results of the previous reports. However, the applicability of the
universal primers was not successful among all the polychaete taxon. Hence, it
demands for an universal COI primers for polychaetes specifically. Similarly, the
phylogenetic analysis using maximum likelihood tree showed consistent clade
pattern with good bootstrap support in both congeneric and conspecific clades
based on 18S gene, and the 18S-rDNA could be suggested as useful molecular
marker for the polychaetes identification. Most interestingly, to best of our
knowledge this study presents the first report to infer the phylogenetic relationship
of polychaetes based on ITS region in India. The maximum genetic distance
between closely related species was found using ITS gene only. Hence, it could be
also concluded that ITS sequences resolve systematic relationships among
polychaete taxa and could be potential barcode gene.

Coming to the application point of view, a novel attempt was made to test
the efficacy of polychaete to synthesize the silver nanoparticles by an ecofriendly
and cost effective method. The characterization study by UV–vis spectroscopy,
AFM, SEM, EDX, XRD and FT-IR analysis evidenced the formation of AgNPs.
The synthesized nanoparticles showed promising antimicrobial activity against human pathogenic bacterial strains. The silver nanoparticle solution exhibited excellent stability for six months.

Polychaetes are valued by the aquaculture industry as an excellent source of PUFAs, and they have the potential to supplement fish oil as sources of essential lipid components of feeds. Fatty acids, especially Omega-3 fatty acids reduce inflammation and play an important role in brain function and cognitive development, including memory, behavior and other cognitive functions. Considering the above fact the present study was carried out to evaluate the fatty acids of polychaete as potential inhibitors of GBM and an in silico assessment of its ADME properties. From the obtained results it is discerned that the fatty acids especially polyunsaturated fatty acids could be an important source for the development of more effective tumor therapeutics. Thus, a better understanding of the close interaction(s) between target proteins and fatty acids (PUFAs), their metabolites may pave way for the development of newer therapeutic strategies in glioblastoma multiforme.