Summary

A plant source, *Elaeagnus indica* Servett., belonging to family Elaeagnaceae and its ethanolic extract and silver nanoparticle synthesised from *E. indica* were subjected for screening anticancer potentials against Ehrlich Ascites Carcinoma using *in-vitro*, *in-vivo* and *in-silico* studies. The plant was standardized both chemically and biochemically, before conducting *in-vitro* and *in-vivo* experiments, to maintain the consistency of the results. The secondary metabolites present in the different extracts were identified qualitatively and the important phytochemical compounds were estimated quantitatively. The free radical scavenging activity was tested through various antioxidant free radical scavenging assays. The result concludes that the ethanol extract has significant anticancer potential and it has selected for screening *in vitro* and *in vivo* anticancer screening.

The silver nanoparticles were synthesised and characterized through high throughput technologies such as UV-Visible Spectroscopy, FTIR, TEM and DLS. Then, both the ethanolic extract and silver nanoparticles were taken for further *in vitro* and *in vivo* analysis. *In vitro* cytotoxic effect was examined using Trypan blue method and MTT Assay. The results depict that both *Ei*E-L-Et and *Ei*E-L-AgNPs have excellent cytotoxic effect towards EAC and HT29 cell lines.

Toxicity study was carried out to identify toxic effects of *Ei*E-L-Et and *Ei*E-L-AgNPs on swiss albino mice. Adult Swiss albino mice were selected as experimental model and divided into eleven groups, except control group, other groups were received different concentrations of *Ei*E-L-Et and *Ei*E-L-AgNPs. On the 15th day, the animals were sacrificed; blood, serum, liver and kidney samples were taken and used for further experiments. The body weight of the animals, hematological parameters, biochemical parameters, hepatic enzymes and cell architectures of liver and kidney tissues showed no significant differences among treated groups and control. Thus, it was evident that both the *Ei*E-L-Et and *Ei*E-L-AgNPs were observed as non toxic compounds and taken for screening in *in vivo* anticancer studies.

Anticancer study was carried out to examine the cytotoxic potentials of *Ei*E-L-Et and *Ei*E-L-AgNPs in EAC bearing mice. The parameters such as Survival time, Body Weight, Tumor growth response, hemoglobin, RBC, WBC, biochemical parameters, Lipids profile and nucleic acids were examined in different samples. The altered levels of these parameters
in EAC induced tumor bearing mice were brought back to normal levels on treated groups with the EiL-Et and EiL-AgNPs.

Treatment with EiL-Et and EiL-AgNPs of *E. indica* reduced the elevated levels of serum hepatic marker enzymes such as AST, ALT, ALP and LDH in EAC induced Swiss albino mice. The elevated levels of glycoproteins such as protein bound hexose, hexosamine, sialic acid and fucose in tumor bearing animals indicates the degree of malignancy. Treatment with EiL-Et and EiL-AgNPs reduced glycoprotein levels indicating the cytostabilizing property of selected plant. The antioxidant property was found to be enhanced with the sufficient restoration of antioxidant enzymes such as GPx, SOD and Catalase. The level of GSH was increased on treatment with plant extract which is a potent inhibitor of neoplasatic process. Histopathological study of liver of tumor bearing animals treated with EiL-Et and EiL-AgNPs revealed almost normal hepatocytes with binucleated cells. Enlarged nuclei with granular cytoplasm were also observed and thus the tissue architecture was almost restored.

Effort made to isolate the compounds which are responsible for anticancer effect from *E. indica* revealed a new compound and its structure was predicted by using by UV-Vis, FTIR, $^1$H-NMR, $^{13}$C-NMR, GC-MS and MS methods. The new compound was subjected to *in-silico* docking studies. Methyl {4-[(iminomethylidene) amino]phenyl} acetate present in the extract effectively docked with the target protein, Bcl-2, forming three hydrogen bonds with binding energy of -8.7kcal mol$^{-1}$. Compound identified in the EiL-Et might have probably prevented the inhibition of apoptosis by deactivating the Bcl-2.