INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Off late by 2020, breast cancer (BC) has superseded lung cancer incidences globally. Being the most aggressive subtype of BC, triple-negative breast cancer (TNBC) is difficult to tackle with conventional treatment approaches. Even though side effects restrain the use of contemporary methods; surgery, chemotherapy and radiation remain in the mainstream. At the beginning of the 19th century, improvements in organic chemistry unveiled active compounds from plants called phytochemicals, found to have excellent therapeutic efficacy against cancer. Nevertheless, low bioavailability and hydrophobicity limit the potential of these plant-derived compounds. It is well evident that nanotechnology tools could effectively bypass these limitations. Therefore, in the current study, phytochemical conjugated gold nanoparticles (AuNp) were prepared to target TNBC cells via EPR effect passively. Phytochemicals such as ethyl ferulate (EF), ellagic acid (EA), coronarin D (CD) and epoxy azadiradione (EAZD) were used to reduce gold chloride into AuNps. Formation of EF-AuNp, EA-AuNp, CD-AuNp and EAZD-AuNp were confirmed by UV-visible spectroscopy, XRD, EDX, TEM and FT-IR spectra. Our in-vitro analysis using MTT assay, colony-formation assay, PI-FACS and live and dead assay evidenced the anti-cancer potency of these phyo-nano complexes. Conclusively, EAZD-AuNp induced superior anti-proliferative and cytotoxic effects in MDA-MB-231 cells than other nanoparticles. Hence, it is worthwhile to proceed with *the in-vivo* studies and the molecular pathway analysis of this meritorious compound which would help this drug journey to the clinic.