Indian-origin scientists have developed a non-invasive method to fight heart disease by creating sticky nanoparticles that can deliver drugs targeting damaged arteries.

One of the standard ways to treat clogged and damaged arteries currently is to implant vascular stents, which hold the vessels open and release such drugs as paclitaxel.

The researchers, led by Clemson University's bioengineering professor Naren Vyavahare, hope their advanced nanoparticles could be used alongside stents or in place of them.

"Healthy arteries have elastic fibres that provide elasticity. They are like rubber bands in the tissue that allow expansion and recoil during blood flow," Vyavahare said.

"In most cardiovascular diseases, elastic fibres in arteries get damaged, creating hooks that can be used to target drugs," Vyavahare said.

The nanoparticles, coated with a sticky protein, latch onto damaged arteries and can deliver a drug to the site in slow release fashion.

These nanoparticles can be engineered to deliver an array of drugs to the damaged or clogged artery, a common example being paclitaxel, which inhibits cell division and helps prevent growth of scar tissue that can clog arteries.

These particles also have unique surfaces that allow prolonged circulation time, providing more opportunities for these particles to accumulate at the damage site.

"We developed nanoparticles that have antibodies on the surface that attach to diseased sites like Velcro," said Vyavahare.

"Interestingly, these newly created nanoparticles only accumulate at the damaged artery, not in the healthy arteries, enabling site-specific drug delivery," Vyavahare said.

"These nanoparticles can be delivered intravenously to target injured areas and can administer drugs over longer periods of time, thus avoiding repeated surgical interventions at the disease site," said Aditi Sinha, a Clemson graduate student and lead author of the study.
The study will be published in the journal Nanomedicine: Nanotechnology, Biology and Medicine.