

1. **Title of research project:** Development of Propolis loaded nanosilver with enhanced antimicrobial activity
2. **Name of PI:** Dr. Sharvil Patil
3. **Funding Agency:** UGC(Minor Research Project)
4. **Project Reference number/ File number:** 47-1519/10 (WRO) Dated 28/09/2010
5. **Executive summary of the project along with output:**

The objective of the current work was investigate ecofriendly method for synthesis of silver nanoparticles and further to assess its ability for combination of lipophilic constituents with AgNPs. Gelucire 50/13 (GL) contains Stearic acid, Tripalmitic acid, esters of glycerol plus mono- and di fatty acid esters of PEG-1500 which have large number of -OH groups was screened for this purpose since the literature suggest hydroxyl groups present in the reducing agents play an important role in *situ* reduction of AgNO<sub>3</sub>. The silver nanoparticles show Surface Plasmon Resonance (SPR) in the range of 400-500 nm depending on size and shape of the formed particles. The formation of propolis loaded silver nanoparticles was confirmed by UV-visible spectroscopy, Particle size analysis, Powder X ray diffraction analysis, Fourier transform infrared spectroscopy and transmission electron microscopy. Spherical shaped silver nanoparticles showed single absorption band when analyzed by UV visible spectroscopy. The results of wound healing study in rats indicated that propolis loaded silver nanoparticles prepared using solid dispersion of Propolis and gelucire significantly enhanced the wound healing activity of silver nanoparticles. Number of activities associated with Propolis such as anti-inflammatory, antimicrobial along with broad spectrum antimicrobial activity of SN might have shown enhancement in wound healing activity. However, physical mixture of Propolis and SN i.e. PMSN did not show enhancement in activity of silver nanoparticles suggesting that preparation of solid dispersion of Propolis was essential step during combination of Propolis and silver nanoparticles.

## **Results Achieved**

The current work proposes conceptual method for green synthesis of silver nanoparticles. In this method hydrophilic lipid used i.e. gelucire 50/13 act as a reducing agent for in situ reduction of  $\text{AgNO}_3$ . Additionally, well reported use of gelucire as solubilizing agent for lipophilic drugs was utilized for effective loading of lipophilic constituents of propolis onto the surface of silver nanoparticles. The current work may be useful for those lipophilic drugs which have gained resistance against specific microbes since loading of these drugs onto the silver nanoparticles may enhance their antimicrobial activity.

## Publications

**Sharvil Patil**, Nilesh Desai, Kakasaheb Mahadik, Anant Paradkar. Can Green Synthesized Propolis Loaded Silver Nanoparticulate Gel Enhance Wound Healing Caused By Burns? **European Journal of Integrative Medicine**. 2015, 7, 243-250.