ABSTRACT

Cholesterol and its esters are important steroids which are responsible for atherosclerosis and gallstones in human body. The current ways of treating atherosclerosis are surgical procedures such as balloon angioplasty, use of stents and the use of drugs such as gemfibrozil, lovastatin, atorvastatin, cholestyramine, simvastatin and probucol. There are strong evidences to show that cholesterol lowering treatment with the use of these drugs may have increased non-medical deaths such as suicides, accidents and homicides. This necessitates a detailed systematic study to introduce alternate medicines that are effective against the diseases without any associated risks. In this context the use of medicinal plants for the treatment of atherosclerosis and gallstones is thought of.

Sidha and ayurvedic systems are ancient ways of medical practice in India which mainly use the herbal products. The presence of secondary metabolites in the plants are responsible for the biological process which in turn are used for curing many diseases without any associated risks. For example it is known for years that the Jain community from the northern part of India are very less prone to heart diseases and it has been found that they use more amount of garlic and onion in their food. It has been found that secondary metabolite called ajoene in garlic is responsible for the hypolipidaemic effect. The present investigation deals with the crystallization of cholesterol in the gel medium using solubility reduction technique.
Cholesterol is crystallized using various solvents such as acetone, ethanol, acetic acid and isopropanol. The effect of various parameters such as gel density, pH of the gel medium, and concentration of the supernatent solution have been studied. The gel grown cholesterol crystals are characterized using x-ray diffraction, IR and thermal analysis which confirm that the grown crystals are cholesterol monohydrate.

The effect of medicinal plants on the crystallization of cholesterol has been studied. The extracts of eighteen important medicinal plants which are used in sidha medicinal system and in folk medicines are used as the additives inside the gel medium and the effect on the number density, size and morphology of the cholesterol crystals has been studied.

Bile acids are derivatives of cholesterol which are used as therapeutic agents for the dissolution of cholesterol gallstones. Cholic acid is one of the bile acids, that exhibits polymorphism and intercalation phenomena, is also crystallized for the first time in the gel medium as well as in organic solvents. Acetone has been used as the solvent for crystallization. The gel grown crystals are found to have water as the guest inside the crystals and the solution grown crystals are guest free. The grown crystals are characterized using single crystal X-ray diffraction, IR and thermal analyses. Single crystal XRD analysis shows that the gel grown crystals are of monoclinic type while the solution grown crystals are of orthorhombic type.