In the thesis we have made an attempt to study the effects of variation of viscosity on resistance to flow of blood and shear stress in an artery with mild stenosis by considering various viscosity variations in the artery. The analytical results show that resistance to flow and shear stress decreases or increases as the viscosity of blood decreases or increases respectively due to viscosity variation. Similarly the effect of peripheral layer viscosity has been studied which shows that resistance to flow and wall shear decreases as the peripheral layer viscosity decreases. Also the effect of bypass in a stenosed artery on resistance to flow and shear stress is proposed and analyzed and it has been shown that bypass decreases resistance to flow and wall shear stress in a stenosed artery.