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Current status of Diabetes and a need for novel formulations of thiazolidinediones

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Worldwide it is estimated that 220 million people suffer from Diabetes Mellitus and among all the diabetic patients, almost 90% suffer of Type 2 Diabetes. Twenty one million people in the United States, accounting for 7 % of the population, have Diabetes Mellitus (DM) according to the American Diabetes Association (ADA). One third of these people are not aware that they are diabetic as another 41 million people are pre-diabetic. The total economic cost annually of Diabetes is approximately 132 billion dollars. Diabetes is more frequent among African Americans, Hispanic Americans, American Indians and Asian/Pacific Islanders. In people age 20 and older, 9.6% have Diabetes and in patients of 60 years or older 20.9 % have Diabetes. Diabetes is the sixth leading cause of death in the U.S, according to the center for disease control and prevention (CDC). The widespread occurrence of obesity supports the projection that cases of Diabetes will continue to grow. Diabetes causes a significant economic burden both in terms of direct and indirect costs to society. It is also responsible for increased morbidity and mortality. Three metabolic defects are responsible for the progression to Type 2 Diabetes Mellitus: peripheral insulin resistance, impaired β -cell function, and increased hepatic glucose production. In modern age medicine, treatments are available for Diabetes Mellitus like Sulfonylureas, GLP-1 agonists, DPP4 inhibitors, PPAR- γ agonists, GPR119 agonists and SGLT2 inhibitors. The thiazolidinediones are a new class of agents that have been developed to treat Type 2 diabetic patients. Pioglitazone hydrochloride acts as an agonist at peroxisome proliferator-activated receptors (PPARs) in target tissues for insulin action, such as adipose tissue, skeletal muscle, and liver. Activation of the PPAR- γ regulates the transcription of insulin-responsive genes involved in the control of glucose production, transport, and utilization. In this manner, it enhances tissue sensitivity to insulin. Since there is a decrease in solubility with increase in pH and the half life being 3-5 hrs, so is incomplete absorption and eliminated quickly from the conventional tablets. Pioglitazone hydrochloride being a non-polar drug and cannot effectively break down the lattice structure of water and hence its aqueous solubility is low. The objective of the present research work was to perform solubility studies in various oils and surfactants along with the cosolvents and to develop an optimum SEDDS for Pioglitazone HCl. SEDDS were characterized for size and zeta potential and *in-vivo* studies were performed to assess the bioavailability. Pioglitazone, a widely prescribed anti diabetic drug belongs to class II under BCS and exhibit low and variable oral bioavailability due to its poor aqueous solubility. Its oral absorption is dissolution rate limited and it requires enhancement in the solubility and dissolution rate for increasing its oral bioavailability. The rate and extent of release of pioglitazone Hcl from stable SEDDS (F1) was high in 1% SLS when compared to SGF. The FTIR spectra proved that there was no chemical interaction between excipients and drug. SEM studies confirmed that the size was small and spherical.

Biography

Gannu Praveen Kumar, Professor and Principal in Sahasra Institute of Pharmaceutical Sciences since April 2014, graduated from H.K.E's society college of Pharmacy, Gulbarga University in 1997, post-graduation from BITS, Pilani in 1999 and PhD from UCPSC, Kakatiya University in 2009. He worked as Assistant Professor for Vaagdevi college of Pharmacy, from 1999-2005, as Associate Professor for SR College of Pharmacy from 2008-2010, as Professor and HOD for Talla Padmavathi College of Pharmacy from 2010-2011 and as Professor & HOD for St. Peter's Institute of Pharmaceutical Sciences from 2011 to 2014. Since 2009, he was appointed as an external examiner for post-graduation and has guided 30 MPharm students. He has published in both National and International journals and compiled few chapters for text books. He received Gem of India award in the year 1999. He was selected as a best academican of Vaagdevi College of Pharmacy in 2002 and of Talla Padmavathi college of Pharmacy in 2011. He is an advisor for few pharmaceutical companies. He visited foreign countries like London, Dubai, Singapore, Malaysia and Spain as invited speaker.

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