A large numbers of novel drug delivery systems are investigating day by day for drug administration through various routes. Oral administration is considered to be the most convenient and preferred mode of drug delivery for superior patient compliance as compared to other modes of drug delivery. However, oral administration of most of the drugs suffers from short term limitations such as their poor oral bioavailability due to incomplete absorption and/or degradation in the gastrointestinal tract (GIT). Many of the drugs exhibit a narrow absorption window in the upper part of the GIT because of proximal part of the small intestine exhibits extended absorption properties (including larger gaps between the tight junctions and dense active transporters). The extent of absorption is limited at these sites as the drug passage is rapid through these regions despite the extensive absorption properties at the duodenum and jejunum. The net absorption of the drugs exhibiting narrow absorption window can significantly be improved by enhancing the gastric residence time (GRT) of the drug.

Floating drug delivery systems (FDDS) are basically low-density systems that have sufficient buoyancy to float over the gastric contents and thereby remain floating in the stomach for a prolonged period of time without affecting the gastric emptying rate. While the system is buoyant over the gastric contents, the drug is released slowly at the pre-desired rate from the delivery system and results in an increased GRT and reduced plasma drug level fluctuations. Prolonged gastric retention would extend the absorption phase of the drugs with narrow absorption window. FDDS would be retained in the stomach and proximal part of small intestine while the drug would be release in a controlled and prolonged manner to its absorption sites and thereby improving oral bioavailability, reducing drug wastage and enhancing solubility of poorly soluble drugs at a higher pH values.

A large number of synthetic and natural polymers have been used to achieve the objectives of such formulations. The synthetic polymers suffer from certain demerits such as expensive, produces toxic and side effect, not environmental friendly, poor bio acceptability and biocompatibility, not easy to process, release of acidic degradation products, loses its mechanical properties and poor patient acceptability. They also
produce eye irritation, skin irritation and mild inflammatory reactions during handling and manufacturing of some synthetic polymers.

On the other hand naturally obtained polymers are considered to be safe and equally effective due to their biocompatible or at least biodegradable nature. A wide range of natural polymers such as collagen, alginate and chitosan have been utilized as excipients in formulations. The plant based natural gums and mucilages have number of advantages such as inert, inexpensive, readily and easily available, biodegradable and bioacceptable, non toxic and non irritant, environmental friendly, better patient and public acceptance.

Ranitidine hydrochloride (RH), an H₂ receptor antagonist competitively inhibits the interaction of histamine with its receptors, is well known for the treatment of gastric ulcer and Zollinger-Ellison syndrome. It shows maximum absorption at upper part of GIT. Effective treatment using traditional immediate release solid dosage forms can be achieved by administration of 150 mg of RH, two times a day, which may lead to patient incompliance. Moreover, it exhibits lower bioavailability(50%) when given as oral conventional dosage forms due to diminished absorption (short half life 2.5-3.0 hrs) and colonic metabolism.

To overcome above discussed problems associated with RH, we proposed to develop floating drug delivery system of RH loaded polysaccharide microspheres prepared by emulsification cross linking method to achieve the required floating characteristics of the dosage form and to effectively check the gastro-retentive properties.

In the first part of study dry polysaccharides were extracted from two traditional plants, tamarind (*Tamarindus indica*) and fenugreek (*Trigonella foenum graecum*). Both extracted polysaccharide were subjected for several parameter to find out their suitability used as pharmaceutical excipients. Polysaccharides were evaluated for their physicochemical parameters which revealed an acceptable range of micromeritic properties. Mean value of total percentage glucose concentration in tamarind and fenugreek was calculated 31.9±6.32 and 23.5±4.72 respectively. Molecular weight of tamarind and fenugreek was estimated by refractive index method which found to be 1.79 x 10⁶ and 2.03x10⁶ kg/kg mol respectively. Rheological study indicates that aqueous solution of both polysaccharide possessed non-Newtonian pseudoplastic flow behavior. Finally, cell viability assay confirm that both polysaccharide may be considered as safe excipients during drug delivery. The study
confirmed that both plant polysaccharides (*Tamarindus indica*) and (*Trigonella foenum graecum*) can be considered as effective pharmaceutical excipients for the preparation of novel drug delivery systems.

Localization of ranitidine hydrochloride (RH) into upper part of intestinal tract is beneficial for better drug bioavailability. Present work described the method of preparation of novel plant polysaccharide based floating microspheres for delivery of drug into stomach.

In the second part of study floating-mucoadhesive microspheres were prepared by using extracted TI polysaccharide as mucoadhesive excipients while eudragit as release controlling polymers by using emulsion crosslinking method. Chemical crosslinking was done by using epichlorohydrin. Prepared TI microspheres were evaluated for their drug polymer compatibility study by using fourier transform infIRared spectroscopy (*FT-IR*). Further characterization such as size, surface properties, swelling index, percentage encapsulation, *in-vitro* buoyancy and drug release was performed. *FT-IR* study confirms the chemical crosslinking of extracted polysaccharide and also drug stability during processing of microspheres. Size of microspheres was in the range of 5.38 to 7.84 µm. SEM images revealed that all batches were of spherical in size and smooth surface. Swelling index showed better swelling in the range of 158-257 percentages. Encapsulation efficiency was found to be decreased by decreasing the concentration of polysaccharide. *In-vitro* buoyancy study possesses that formulation F1 showed better floating ability as compared to the others. Finally, *in-vitro* drug release study revealed that prepared microspheres were able to release the 100% drug within 8-12 h, indicating sustain release behavior.

In the third part of study TFG floating-mucoadhesive microspheres were prepared by emulsification, followed by crosslinking method using epichlorohydrin. Prepared microspheres were characterized for drug compatibility by using FT-IR and PXRD method which indicated the stability of drug during processing. Prepared TFG microspheres were evaluated for particle size, surface morphology, swelling properties, mucoadhesive strength, encapsulation efficiency and *in-vitro* drug release. Result indicates that microspheres were of spherical in shape with the particle size range from 4.56±1.4 to 1.23±0.71 µm. *In-vitro* buoyancy study confirm floating ability in range from 78.12±1.86 to 86.59±1.23 percentage. *In-vitro* drug release of ranitidine hydrochloride indicates that prepared microspheres can be prolong the release of drug upto 12 h time period.

Present study concludes that polysaccharide of TI or TFG may be used as an excipients for the preparation of floating-mucoadhesive microspheres.