OBJECTIVE :-
The objective for preparation of gastro resistance Doxycycline tablets are:

Doxycycline is an universal antibiotic use to treat gram negative infections where the susceptible organism was strongly proven to be present and also used to treat different microbial infections. Its half life is around 18 to 22 hours and 80% of the dose is absorbed through small intestine.\(^3^3\)

One of the most common adverse events associated with standard doxycycline formulations is gastro-intestinal upset, which can significantly diminish patient compliance and thus compromise therapeutic outcomes. Historic data suggest that the incidence of nausea and vomiting associated with doxycycline can be up to threefold higher than that reported with other antibiotics.\(^3^4\) Experience of nausea and vomiting contributes to patient discontinuation of therapy or non-adherence with prescribed dosing and thus suboptimal therapeutic outcomes. Furthermore, due to concerns about impaired absorption of drug from standard formulations. Anorexia, nausea, vomiting, diarrhea, glossitis, dysphagia, enterocolitis, and inflammatory lesions (with monilial overgrowth) in the anogenital region. Hepatotoxicity has been reported. These reactions have been caused by both the oral and parenteral administration of tetracyclines. Instances of esophagitis and esophageal ulcerations have been reported in patients receiving capsule and tablet forms of drugs in the tetracycline class.

Enteric-coating of drugs emerged in the middle part of the last century as a method to improve the tolerability of oral drugs.\(^3^5\) Enteric coating protects a drug from the acidic pH of the stomach, delaying release until the drug reaches the more alkaline small intestine. This reduces the rate of nausea and vomiting and also protects the stomach from exposure to potentially harmful drugs (such as in the case of aspirin). In addition to these protective effects, enteric coating can be employed as a method for delayed release or controlled release of a drug, as well.
The objective for Gastro Retentive tablets of Metformin HCL and Glimepride are:

Metformin Hydrochloride is an orally administered biguanide derivative widely used in the treatment of non-insulin dependent diabetes mellitus. It improves glycaemic control by enhancing insulin sensitivity in liver and muscle. Metformin also has beneficial effects on several cardiovascular risk factor such as dyslipidemia, elevated plasma plasminogen activator inhibitors, other fibrinolytic abnormalities, and hyperinsulinemia and insulin resistance.36,37

Glimepride is one of the third generation sulfonylurea drug useful for control of diabetes mellitus, type 2. Preclinical investigation of glimepride suggested a number of potential benefits over sulfonylureas currently available including lower dosage, rapid onset possibly due to less stimulation of insulin secretion and more pronounced extra pancreatic effects.

A Glimepride and Metformin HCl combination is used to treat high blood sugar levels that are caused by type 2 diabetes. Normally, the pancreas release insulin after eating to help the body store excess sugar for later use. This process occurs during normal digestion of food. In type 2 diabetes, the body does not work properly to store the excess sugar and the sugar remains in the bloodstream. Chronic high blood sugar can lead to serious health problems in the future. With two different modes of action, the combination of Glimepride and Metformin HCl help the body cope with high blood sugar more efficiently.38 Immediate action of Glimepride will be helpful to control excess sugar, which will be maintained by Metformin HCl action later on. Thus, the developed single tablet will be sufficient instead of two to three tablets of both drugs per day, and it will also increase patient compliance and therapeutic efficacy.

The marketed immediate released product needs to be administered 2-3 times daily. The current metformin therapy is associated with high incidence of side effects seen in about 30% of patients. The continue efforts to improve pharmaceutical formulation in order to optimize therapy and patient compliance, various efforts has been tried to develop a modified release, once ‘twice a day formulation. As a result of such efforts, many modified release formulations are available.39 A conventional oral sustained release formulation release most of the drug content at colon, which require that the drug should have absorption window either in colon or throughout the GIT. Metformin has poor colonic absorption in healthy human subjects. Release of metformin after the small intestine would thus be of no therapeutical value.40 Thus there is a
strong need to develop gastro retentive formulation of metformin HCl, which release the drug in stomach before passing the absorption window.