drugs and xenobiotics that can harm the body. Drug metabolites are usually more hydrophilic than is the parent molecule and, therefore, the kidneys more readily excrete them. Drugs that are absorbed from the gut reach the liver via the hepatic portal vein before entering the systemic circulation (Brenner & Stevens, 2013). Many drugs are extensively converted to inactive metabolites during their first pass through the gut wall and liver, and have low bioavailability after oral administration. This phenomenon is called the first-pass effect (Martinez & Amidon, 2002). Drug metabolism can be divided into two phases, each carried out by unique sets of metabolic enzymes. In many cases, phase I enzymatic reactions include oxidative, hydrolytic and reductive reactions, create or unmask a chemical group required for a phase II reaction. In phase II metabolism, drug molecules undergo conjugation reactions with an endogenous substance such as acetate, glucuronate, sulfate, or glycine. Conjugation enzymes, which are present in the liver and other tissues, join various drug molecules with one of these endogenous substances to form water-soluble metabolites that are more easily excreted (Duffus & Worth, 1996; Jancova et al., 2010).

Excretion is the removal of drug from body fluids and occurs primarily in the urine through the kidney. Other routes of excretion from the body include in bile, sweat, saliva, tears, feces, breast milk, and exhaled air (Shargel et al., 2005).

1.1.3. Factors affecting the oral drug delivery

Many factors may affect the delivery of oral drug, and finally affect the rate and extent of oral drug absorption. These factors can be divided into three categories. The first category comprises physiological factors, such as gastrointestinal pH, gastric emptying, small intestinal transit time, bile salt, absorption mechanism, intestinal and