nanoparticles. The results evidenced that Neem-containing BG nanoparticles presented lower bioactivity in contrast with glasses, but improved antibacterial activity more than silver-doped BG nanoparticles. Thus, the authors suggested that this material could act as a potent antibacterial agent in tissue engineering (Prabhu et al., 2014).

Curcumin is another natural compound that has been studied, which is a yellow pigment derived from *Curcuma longa* L. Curcumin presents many medical properties like antiinflammatory, antioxidant, antiretroviral, and antibacterial, among others (Gunes et al., 2016). Gunes et al. (2016) evaluated the antibacterial activity of curcumin against standard bacterial strains: methicillin-sensitive *S. aureus*, methicillin-resistant *S. aureus*, *E. faecalis*, *Bacillus subtilis*, *P. aeruginosa*, *E. coli*, *Klebsiella pneumonia*, and observed that curcumin presented antibacterial activity against all strains when used in high concentrations (above 129 μg/ml). Nicolini et al. (2016) studied BGs and mesoporous BGs containing curcumin and observed that BGs can be suitable carriers for curcumin, and that its release rate is not affected by the substrate but is pH-dependent.

The use of natural compounds as therapeutics for treatment of osteomyelitis is still a new field of research; thus, only a few examples are available. However, it is expected to lead to a larger number of researches involving these compounds, once they can be easily found in nature, and may cost less than synthetic drugs.

14.2.3.2 BGs for Release of Drugs

The release of drugs and biomolecules (except natural compounds) from BGs is one of the most researched applications of glasses as biomaterial (Galarraga-Vinueza et al., 2017). For treatment of osteomyelitis, there are several works available in the literature reporting the release of an antibiotic from BGs. Most of these works highlight two important factors to be considered: (1) how the drug is bonded to the carrier system; (2) and what kind of glass morphology and composition is used.

In relation to the bond between the drug and the glass, usually the biomolecules used as a drug interact with Si-OH bonds of silanol present in the surface of the glass. This intermolecular interaction promotes an improved adhesion of the drug on the glass surface. However, other strategies can be used in order to enhance this intermolecular interaction. Domingues et al. (2004) produced BGs loaded with tetracycline hydrochloride (BT) and with a complex formed by tetracycline and β-cyclodextrin (BTC). The authors came to the idea of using BGs loaded with BTC complex because the β-cyclodextrin prevents strong chemical interactions between the BGs and the tetracycline, which maintains the original structure of BT. That, in turn, promotes a improved sustained release of tetracycline. The authors tested the antibacterial effect in vitro against *Actinobacillus actinomycetemcomitans*, and proved that glasses containing the BTC complex showed better results than glasses containing BT due to a more controlled release.

In regard to glass morphology, different glass designs have been developed to delivery antibiotics, like microsized, nanosized, or mesoporous structures. Microparticles and nanoparticles can be used as powder, pellets, or scaffolds.