FIG. 1 Rationale of controlled-drug delivery system.

nanoparticles, monoclonal antibodies in which a recognition factor is attached on the surface of the delivery system, and drug-loaded red blood cells [21].

The primary aspect of controlled-drug delivery system is to ensure safety and to improve efficacy and patient compliance of the therapeutics. This is further dependent on the modifications to the plasma drug levels and frequency of dosing. When compared with the conventional dosage forms, controlled-release dosage form can provide desired therapeutic plasma concentration for prolonged time [17, 21].

In the case of drugs with low value of therapeutic index, it is necessary to dose at intervals shorter than the half-life of the drug to produce optimum effects. This inconvenient regimen leads to lowering of the compliance and consequently inadequate treatment. By modifying the release rate to decrease the rate of absorption, the dosing interval can be increased according to convenience. These two approaches can decrease the drug concentration fluctuations in blood plasma without the change in drug concentrations by low dosing or overdosing. When we attempt to extend the dosing interval by decreasing the rate of absorption, there may arise an issue of finite residence time at the site of absorption [22]. For example, assuming for drugs having an effective absorption time of approximately 8–11 h if there is a decrease in rate of absorption by a maximum level, the drugs can pass without getting absorbed in the intestine and reach the large intestine. In the large intestine, the absorption is least and has greater unpredictability and has the presence of bacterial degradation [22, 23].

3. TERMINOLOGIES USED FOR DESCRIBING CONTROLLED-RELEASE FORMULATIONS

Despite numerous controlled-release products being marketed every year, the terminology used is paradoxically uncontrolled. The term "modified release" is a generalized term for any dosage form that is modified intentionally to alter the release of the drug for obtaining the desired therapeutic effect.