In vitro Release Test Conducted for Liposomal Caffeine

In vitro Test

In vitro release of Liposomal caffeine was investigated using dialysis membranes with adaptations. Plain caffeine was used as a control. The system consists of (1) a donor compartment covered by a dialysis membrane (Sigma–Aldrich, Mw cut-offs: 12,000 Da) where the sample diluted with phosphate buffer pH 7.4 + ethanol (1:1) were added approx. (3 mL), and (2) a receptor compartment containing same solution i.e. phosphate buffer (PBS) pH 7.4 with ethanol (1:1), (80 mL), maintained at 37°C ± 0.5 under stirring (100 rpm) in shaker. At pre-determined time intervals, samples were withdrawn (replaced with fresh medium) and immediately analysed by UPLC (Ultra high-performance liquid chromatography) with mobile phase- 0.5% ethyl acetate: 11.3% acetonitrile: 88.2% water with 0.05% orthophosphoric acid. Used reverse phase C-18 Column at 280 nm. The content was calculated accordingly. Cumulative drug release was plotted against time to obtain the release profile of liposomal caffeine with control.

Results

The liposomal caffeine exhibited a sustained-release profile up to 12 hours, with a total release of 93% as shown in Figure below. In contrast, the release for normal caffeine solution was much faster, achieving 81% within 5 hrs, indicating the permeability of caffeine through the dialysis membrane used.

Cumulative drug release of caffeine vs Liposomal caffeine:

	Caffeine Percentage (%)	Liposomal Caffeine Percentage (%)
0	1.5	0
1	61.6	18.56
2	72.52	34.88
3	77.8	55.56
4	80.26	64.72
5	81.09	72.18
6	90.32	81.01
7	85.26	87.1
8	92.03	91.88
12	97.1	93.4