Carbamazepine transforms to its dihydrate form when it comes in contact with the aqueous medium. Since dihydrate form of carbamazepine is three times lesser soluble (0.12 mg/ml) as compared to its anhydrous (0.38 mg/ml) form; such transformation is a critical parameter that affects its dissolution and bioavailability [1]. It is reported in the literature that co-crystal formation of carbamazepine is a suitable approach to increase its rate of dissolution. Transformation of carbamazepine to dihydrate form is prevented when carbamazepine is in its co-crystal form. This is so, as in the co-crystal structure the hydrogen bonding occurs between the appropriate functional groups of drug and co-former. There are two possible hydrogen bonding sites in carbamazepine structure—‘N’ of amine and ‘C’ of carboxyl; and hence carbamazepine transforms to dihydrate in an aqueous medium. These sites are expected to undergo hydrogen bonding with co-former during co-crystallization processes [2-4].

In crystal engineering, hydrogen bonding is the strongest and key interaction in the co-crystal formation. Glucomannan is polyoxyxgenated compound and contains hydroxyl groups in abundance. Hydroxyl group is highly polar and capable of forming hydrogen bonds with other polar molecules. Therefore glucomannan isolated from the seeds of *Ocimum basilicum* was selected as a co-former in the present study [5]. At present study co-crystallization of carbamazepine was carried out by adopting solution-mediated phase transformation (SMPT) [6]. The hydrogel was isolated from the seeds of *Ocimum basilicum* by the method reported earlier. Glucomannan present in the hydrogel was precipitated with 95% ethanol at 4 °C by following the procedure reported by Chua M et al; 2012 [7, 8]. FT-IR spectrum of Glucomannan was obtained on IR spectrophotometer (Shimadzu, FTIR-8400S, Japan) using KBr ethanol at 4 °C by following the procedure reported by Chua M et al.; 2012 [7, 8].

**Results:** Co-crystal formation due to hydrogen bonding between carbamazepine and glucomannan as a co-former was confirmed by FTIR study. Inhibition of transformation of co-crystal of carbamazepine to carbamazepine dihydrate in aqueous medium was confirmed by SEM.

**Conclusion:** Inhibition of transformation of carbamazepine co-crystal to its dihydrate form resulted in its improved dissolution. Dissolution efficiency of carbamazepine in its co-crystal was increased up to 79.26% within 30 min.

**Keywords:** Carbamazepine, Co-crystals, Glucomannan, *Ocimum basilicum*

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nm. There was increase in dissolution efficiency of carbamazepine in its co-crystal form when compared to that with plain carbamazepine. Dissolution efficiency was increased from 30.84%±1.9 to 79.26%±2.32 in first 30 min and was statistically significant.

Fig. 1: FTIR spectrum of glucomannan

Fig. 2: FTIR spectrum of carbamazepine

Fig. 3: FTIR spectrum of co-crystal of carbamazepine and glucomannan

A: Carbamazepine

B: Co-crystal

Fig. 4: SEM images of carbamazepine (A) and it's co-crystal with glucomannan (B)
AUTHOR CONTRIBUTION

SHARWAREE HARDIKAR: Data analysis and interpretation and Critical revision of the article.
ASHOK BHOSALE: Design of the work
SWATI VANAVE: Data collection and drafting the article.
BHAGYASHREE KAMATHE: Data collection and writing the manuscript.

CONFLICTS OF INTERESTS

There is no any conflict of interest

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