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Development and Characterization of Fast Disintegrating Tablets Containing Low Dose Model Drug

Superdisintegrants

Objective

For fast disintegrating tablets, quick disintegration is desired. Sodium starch glycolate (SSG), a cross-linked sodium carboxy methylated (potato) starch, is widely used as superdisintegrant for oral solid dosage forms. The aim of this work was to examine the functionality of different sources of SSGs in developing fast disintegrating tablets of a low-dose model drug.

Experimental

Low dose alprazolam tablets (1mg/tablet) were produced by direct compression, carried out using 9 x 4.5 mm standard concave capsule shaped punches at two hardness settings on a rotary compression machine (batch size 10,000 tablet). Six different sources of SSG were compressed at 2% along with spray dried lactose monohydrate, microcrystalline cellulose and magnesium stearate. The blends were characterized by standard quality control analysis for various physical properties such as density and flowability. The tablets were evaluated for weight variation, content uniformity, disintegration time and dissolution.

Results and discussion

Physical properties of the blend showed excellent compactibility of SSG with the other selected excipients. The six different sources of SSG exhibited minimal effect on the physical characteristics of the blend (Figure 1). All blends exhibited "passible" up to "good" flow properties, as defined by Hausner ratio and Carr's Index. The content uniformity of all batches complies as per USP except for one (in batch A one of the tablets showed content of 72% out of 10 tablets and the other 9 tablets showed content above 90%). The dissolution for all the six batches of alprazolam tablets complies as per USP and shows similar release patterns. Physical parameters of tablets (weight, thickness) were checked and found to be within limits. Distinct differences in disintegration time were observed even at similar hardness, with two sources (Primojel® and competitor D) exhibiting faster disintegration compared to remaining four. Noteworthy differences in disintegration were not directly correlated to friability of tablets (Figure 2). This difference in functionality could not be explained by blend properties, thus have to be attributed to variability in the SSG.

Conclusion

For development of fast disintegrating tablets, SSG was found to be a suitable disintegrating agent. This fast disintegration can be explained by the powerful swelling due to rapid uptake of water resulting in fast disintegration of the tablet and release of active ingredient. In this study, excipient source has found to have a significant effect on disintegration characteristic of finished product.

The tablets composition (mg/tab):

Alprazolam	1.00
SuperTab® 14SD	76.0
Pharmacel® 102	39.88
SSG	2.4
Docusate sodium	0.12
Magnesium stearate	1.20

The blend formulation was tested for:

Bulk density (g/ml)	Campbell Bulk Density apparatus
Tapped density (g/ml)	Campbell Bulk Density apparatus
Angle of Repose (deg)	Ph. Eur. Funnel
Flowability (sec)	Ph. Eur. Funnel

The tablets were tested for:

Weight variation (g)	Mettler Toledo PB 153- S
Thickness (mm)	Vernier Caliper (Mitutoyo corp.)
Hardness (N)	Campbell Hardness Tester Model CDHT 100
Disintegration time (s)	USP Disintegration tester-ED-2L
Friability (%)	USP Friabilator

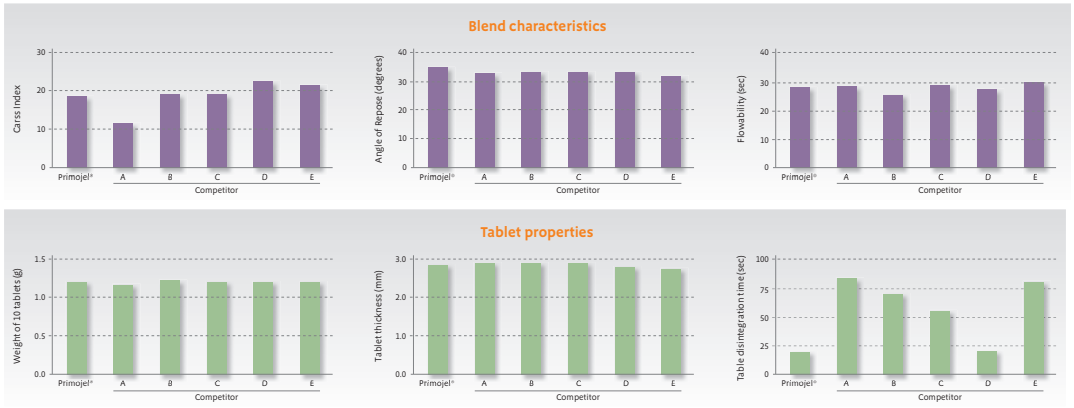

Figure 1: *Effect of six different sources of SSG on the physical characteristics of the blend (Carr's Index and angle of Repose) and the tablets (weight and thickness) containing low dose alprazolam*

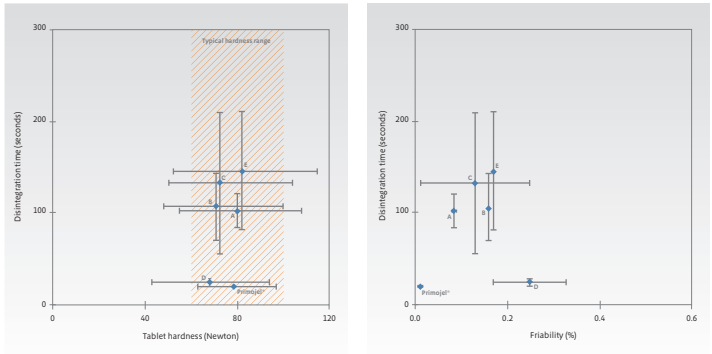

Figure 2: *Disintegration time as a function of tablet hardness (left) of tablets with different sources of SSG, and a comparison of disintegration time versus friability of the tablet (right). Bars indicate minimum/maximum range of hardness (n=20), and disintegration time and friability at two hardness settings (low and high).*

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