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Utilisation of SuperTab© 40LL in the production of mini-tablets

Purpose

According to European medicines agency's- 'Guideline on Pharmaceutical development of medicines for paediatric use'[1]; concept of mini-tablets should be explored considering child's condition and ease of swallowing mini-tablets are tablets with diameter of 3 mm or less.[2] Mini-tablets offer flexibility to titer API doses up to 55% of tablet weight and can also be filled in hard gelatin capsules/sachets. There is also provision to dispense from a mechanical mini-tablet dispenser.[5] The advantages of minitablets are summarized in a research paper by Biplob M et al.[2] Among the benefits described, most significant are 1) ease of swallowing with mini-tablets for pediatric/geriatric populations and 2) dose flexibility so that the dose can be titrated to small increments.[2]

Mini-tablets, due to the small size pose challenges for manufacturability and in-process controls such as weight variation, Disintegration time, uniformity of content, friability & tablet tensile strength.[3] The manufacturing of mini-tablets is perceived to be more challenging than standard tablet manufacturing (eg flow into the mini-tablet dies) due to medium to high API loadings. The flow into the tablet die is a combination of particle-particle and particle-wall interactions.[4]

Methods

A newly marketed product called SuperTab® 40LL with physical parameters as shown in Table 1 has salient features. It has been evaluated for mini-tablet application. Lactose and Lactitol monohydrate are safe & inert excipients. SuperTab® 40 LL composite granules utilizes synergistic characteristics of two safe & inert excipients- Lactose & Lactitol monohydrate resulting in a soluble and excellent flow, powder compaction & drug carrying capacity.

Mini-tablets were prepared in order to demonstrate robustness of SuperTab® 40LL. The functional excipient -SuperTab® 40LL, SuperTab® 24AN:Pharmacel 102(50:50), Marketed co-processed product was blended with 0-45% Paracetamol (x50-38µm) & 4% Primellose in a Turbula blender for 8 min at 62 rpm. 1% Magnesium stearate was added and blending continued for 2 min at 62 rpm. Using concave 3mm multi-tip punch sets, mini-tablets were compressed at compaction force of 7KN.

Results

The new SuperTab® 40LL shows compaction profiles similar to insoluble market co-processed product containing MCC (fig 1). The drug carrying capacity was highest for SuperTab® 40LL (40%) compared to marketed co-processed product (35%) and physical blend of lactose-MCC mixture (30%).

Thus SuperTab® 40LL is soluble excipient system showing excellent flow (fig 2), compactability. According to Calvin Sun et al[6], a minimum FFC of 8.6 is required for high speed tableting. SuperTab® 40LL shows excellent flow [Flow function co-efficient (FFC) > 8.6] even with 30% drug loading.

Conclusion

SuperTab® 40 LL is a highly functional soluble excipient system. Its morphology (structure) enables good flow and dilution potential. Due to its structure created via the manufacturing process, it shows a significant better performance than its individual components. It is recommended for robust direct compression of mini-tablets, high dose formulations & moisture sensitive drugs.

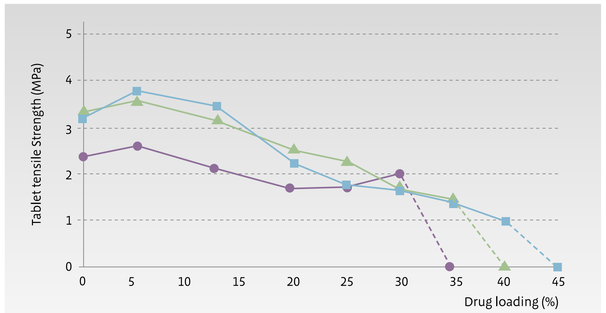

Fig 1: *Tensile strenght vs drug loading of minitablets*

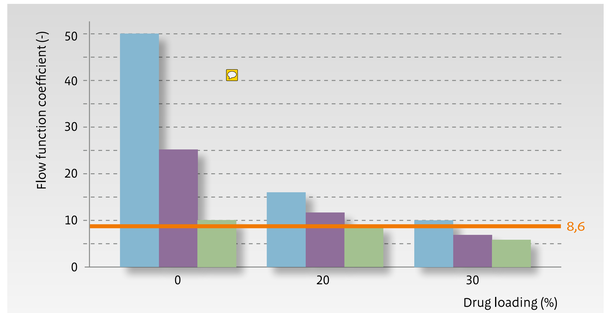

Fig 2: *Comparison of flowability of SuperTab® 40LL compared to marketed co-processed product and physical blend of lactose- MCC mixture.*

Parameter	Specification	Typical
%w/w lactitol	4.0 - 6.0	5.0
%w/w water (KF)	Max. 2.0%	1.0
Bulk density (kg/m³)	-	530
Tapped density (kg/m³)	-	630
FFC (-)	-	45
x50 (Sympatec) (micron)	130-220	170

Tabe 1: *Physical parameters of SuperTab® 40LL*

References

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