

Improving Delivery of Large Nutraceutical Tablets Through Application of an Easy Swallow Film Coating

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Introduction

Swallowability of large sized oral dosage forms is a significant challenge affecting consumer and patient acceptance. This is especially true with nutraceutical formulations, where the dosages are often in very large tablet or capsule sizes. In this study, the application of a film coating system that enhances wet slip behavior, improves mouth feel and makes tablets easier to swallow was evaluated. Multivitamin tablets (1000 mg) were coated with a slippery film coating (Nutrafinish® Easy Swallow Coating) to evaluate improvement in wet slip behavior compared to uncoated tablets and other film coating systems.

Methods

Nutrafinish® Easy Swallow Coating and another Nutrafinish® film coating system were coated onto 10 mm round biconvex and flat-faced placebo tablets in an O'Hara Labcoat I, outfitted with a 12" fully perforated pan, as described in Table 1. Pigmented and clear versions of both film coating systems were applied up to 3% w/w weight gain.

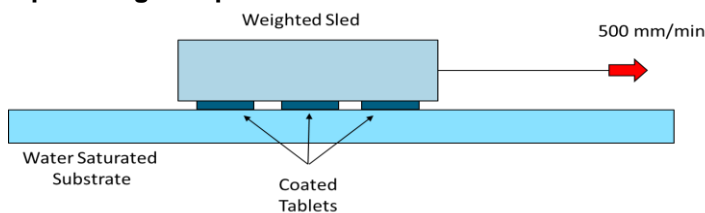
Table 1. Coating Conditions for Clear and Pigmented Versions of Nutrafinish

Parameter	12" Pan (Lab Scale)	
	Clear	Pigmented
Batch Size (kg)	1	1
Solids content (% w/w)	8	15
Spray rate (g/min)	8	
Bed temperature (°C)	40	
Airflow rate (m ³ /hr) / (cfm)	212 /125	
Pan speed (rpm)	18	
Atomizing air pressure (bar) / (psi)	1.4 / 20	
Pattern air pressure (bar) / (psi)	1.4 / 20	

Characterization of Wet Slip, Gloss and Surface Roughness of Tablets

The wet slip behavior of the coating systems was characterized by determining their static and dynamic friction coefficients using an Instron tensile tester.¹ Three tablets weighted with a 0.5N normal force were dragged across a water saturated substrate at 500 mm/min, as shown in Figure 1. A titanium dioxide free pigmented and clear version of Nutrafinish easy swallow was also coated onto 1000 mg multivitamin tablets (oblong, 20 mm x 8 mm). Their wet slip behavior, gloss and surface roughness were measured using the Slip Testing Setup (Figure 1), a Tricor Surface Analysis System and a Nanovea surface profilometer, respectively.

Figure 1. Schematic of Slip Testing Setup



Results

Placebo tablets coated with Nutrafinish Easy Swallow Coating exhibited enhanced wet slip behavior, as shown by the low static and dynamic friction values of 2.1 ± 0.1 and 1.0 ± 0.1 (N/N) (clear formulations) and 2.5 ± 0.1 and 1.33 ± 0.1 (N/N) (pigmented formulations), respectively; which is lower than results for the conventional Nutrafinish coated tablets (Figure 2). A comparison of the wet slip behavior for the flat-faced with oblong multivitamin tablets shows the oblong tablets have lower friction values, indicating they slide easier than flat-faced tablets (Figure 3). This aligns with previously reported data confirming that tablet shape can affect swallowability.²

Figure 2. Comparison of (a) Static Friction and (b) Dynamic Friction for Nutrafinish Easy Swallow and Nutrafinish coatings

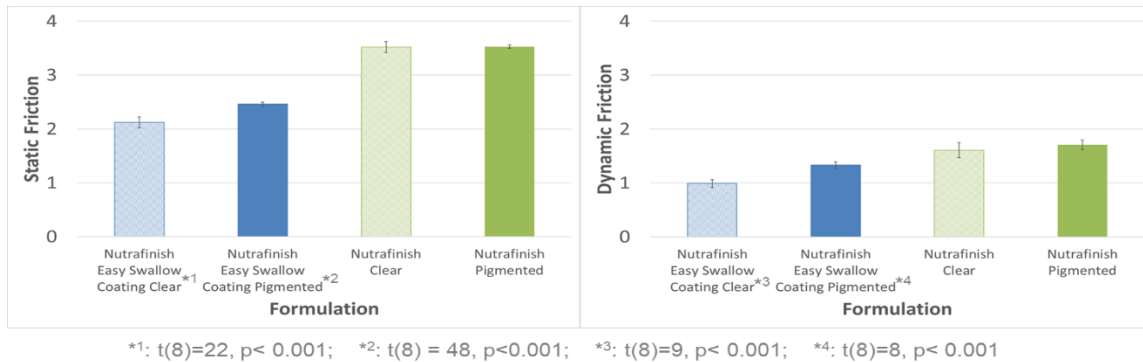
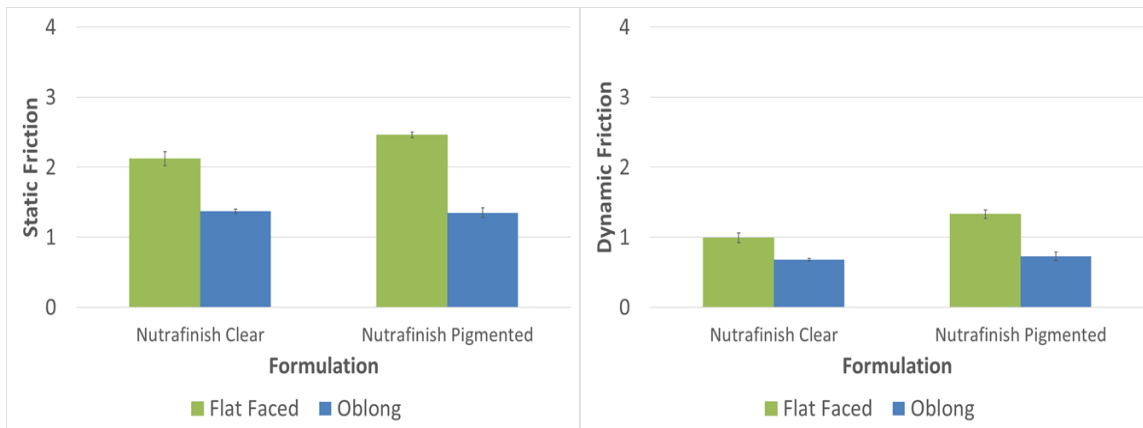
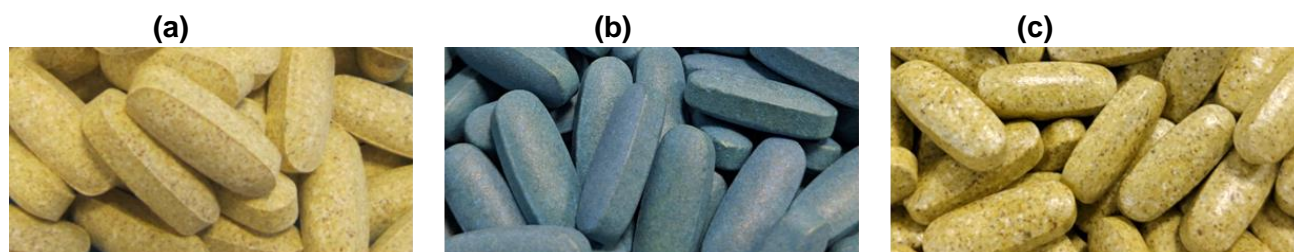


Figure 3. Comparison of (a) Static Friction and (b) Dynamic Friction of Nutrafinish Easy Swallow Coated Flat-Faced Tablets and Oblong-Shaped Multivitamin Caplets.



Multivitamin tablets coated with Nutrafinish Easy Swallow clear exhibited an elegant appearance with a glossy and smooth surface (Figure 4). The tablets exhibited a high gloss value of 151 GU, which was significantly greater than 65 GU obtained for the uncoated tablets. Clear coated tablets also had a low roughness of $3.397 \mu\text{m}$.

Figure 4. Appearance of Multivitamin Tablets (a) Uncoated (b) Nutrafinish Easy Swallow Pigmented Coating (TiO₂ free) and (c) Nutrafinish Easy Swallow Clear Coating



Conclusions

Nutrafinish Easy Swallow coating is a novel film coating system that provides exceptional wet slip behavior which can impart wet-slip and improve tablet mobility during swallowability. Additionally, it provides benefits through high tablet gloss, providing elegance and consumer appeal for easier swallowing for multivitamins tablets.

References

1. Gimbel J., To D., Teckoe J. Rajabi-Siahboomi A. A Study of the Slipperiness of a Developmental Immediate Release Film Coating System. AAPS Poster 2016.
2. Yoder S., Rajabi-Siahboomi J., Miller C., Hansell J., Oza K. Physical Appearance Preferences for Oral Solids Dosage Formulations. AAPS Poster 2014.

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