

Impact of Clean Label Lubricant Inclusion Level and Mixing Time on Tablet Properties

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Introduction

The global market continues to expand for nutritional products, and with consumers having more access to information the demand for label friendly ingredients has increasing importance. Most nutritional formulations in the market use pharmaceutical ingredients such as fillers and lubricants. The present study focused on the development of clean label Nutracore™ lubricant blends to develop tablet formulations from natural sources. Evaluation of the lubrication properties of two Nutracore lubricant blends referred as NCL190032 and NCL190033 were performed.

To evaluate novel label friendly lubricant properties by:

- Evaluation of different levels of label friendly lubricants in placebo tablets
- Impact of lubricant mixing time on placebo and model dietary supplement tablets

Methods

Tablet Preparation:

- Placebo blends (Table 1) were prepared by adding filler blend and Nutracore lubricant in a V-blender and blended for 2 minutes.
- Dietary supplement (DS) containing tablets were prepared using ashwagandha as a model ingredient.
- Formulations were prepared by adding ashwagandha and Nutracore filler blend in a V-blender and blending for 3 minutes, followed by addition of the respective Nutracore lubricant, then further blended for 2 minutes.
- The resulting blend was compressed using a Piccola tablet press at 50 rpm turret speed. Tablets were prepared at 450 mg tablet weight, 10 mm biconvex shape, and compressed at 20, and 25 kN compression force.

Impact of Different Concentration of Lubricant and Mixing Time:

- Different concentrations of lubricant in the placebo tablet formulation were evaluated to determine the optimum level. Tablets were prepared (Table 1) and evaluated for appearance, tensile strength and ejection forces. Based on the results for the optimal lubrication level, the impact of lubricant mixing time was determined.

Results

Determining Optimum Inclusion Level of Lubricants:

- Tablets prepared with NCL190032 lubricant had tensile strength above 1.5 MPa (Figure 1A) which is significantly higher compared to marketed product (clean label lubricant).
- No significant reduction in tensile strength was observed with increasing the concentration of NCL190032 lubricant. Ejection force was excellent (below 400 N).
- The formulation with NCL190032 at 2.5% showed a greater reduction in ejection force with acceptable tablet tensile strength.
- Similar results were observed for the tablets prepared with NCL190033 (Figure 2). A level of 1.5% for NCL190033 was selected for further studies.

Table 1: Composition of Tablet Formulation Containing Nutracore Lubricants

Excipient	%w/w Quantity									
	Formulation with NCL190032				Formulation with NCL190033					
Nutraceutical Filler	99.0	97.5	95.0	45.5	99.5	99.0	98.5	97.5	46.5	
Ashwagandha Powder	-	-	-	52.0	-	-	-	-	52.0	
Nutraceutical NCL190032 Lubricant	1.0	2.5	5.0	2.5	-	-	-	-	-	
Nutraceutical NCL190033 Lubricant	-	-	-	-	0.5	1.0	1.5	2.5	1.5	
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

Impact of Lubricant Inclusion Level

Figure 1. Impact of Concentration of NCL190032 on A) Tablet Tensile Strength and B) Ejection Force

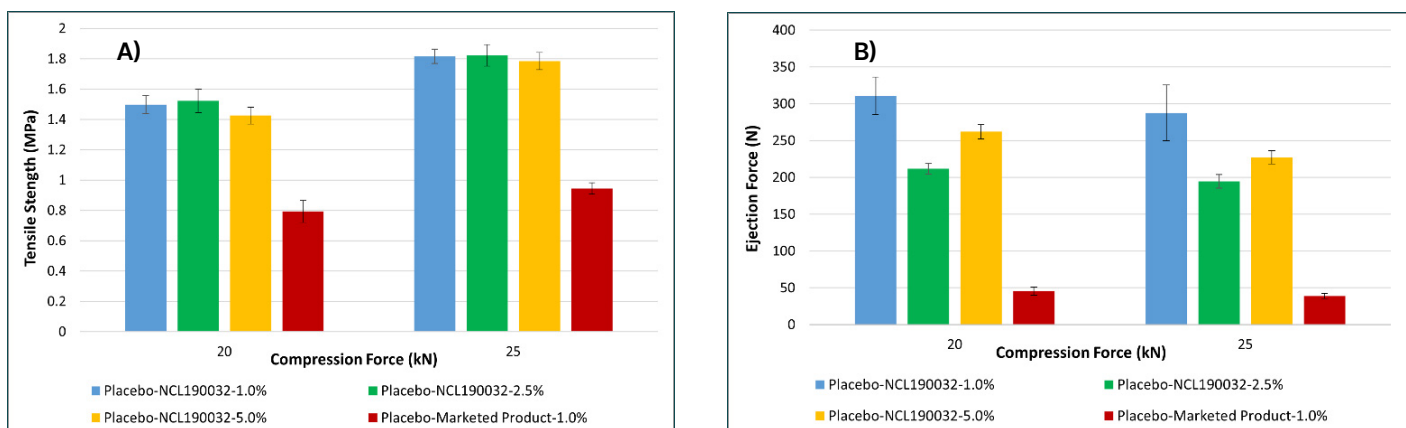
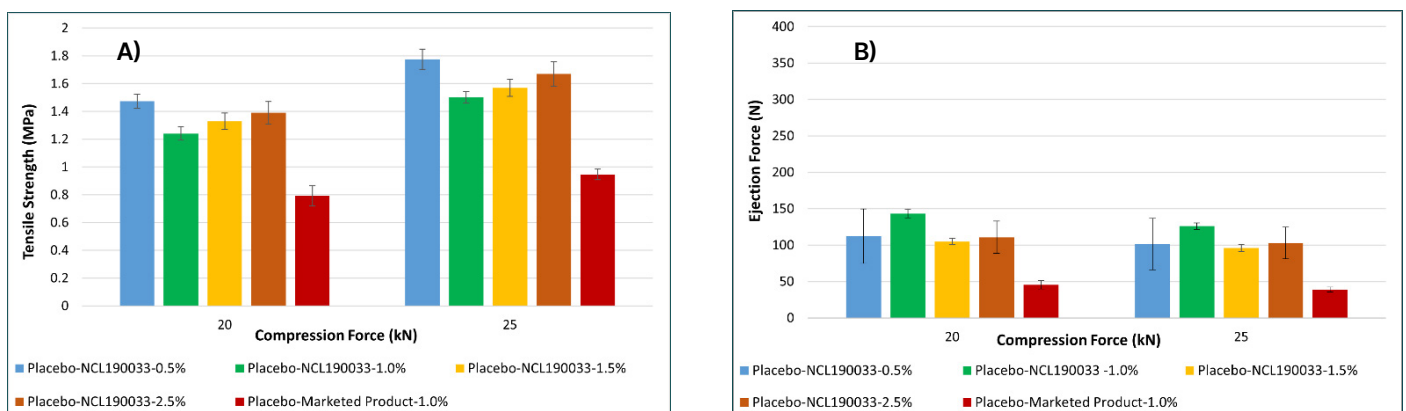


Figure 2. Impact of Concentration of NCL190033 on A) Tablet Tensile Strength and B) Ejection Force



Impact of Lubricant Mixing Time

The tablets prepared with optimized level of NCL190032 and NCL190033 lubricants were evaluated for the impact of lubricant mixing time.

- Based on the results (Figure 3), with an increase in lubricant mixing time, tensile strength showed upward trend for placebo tablets.
- For the active tablets, the tensile strength remained similar.

Based on the results, different lubricant mixing time did not affect the tablet performance. Similar results were observed for NCL190033 (Figure 4).

Figure 3: Impact of Lubricant Mixing Time for NCL190032 Tablet Properties A) Placebo Tensile Strength, B) Placebo Ejection Force, C) DS Tensile Strength, and D) DS Ejection Force

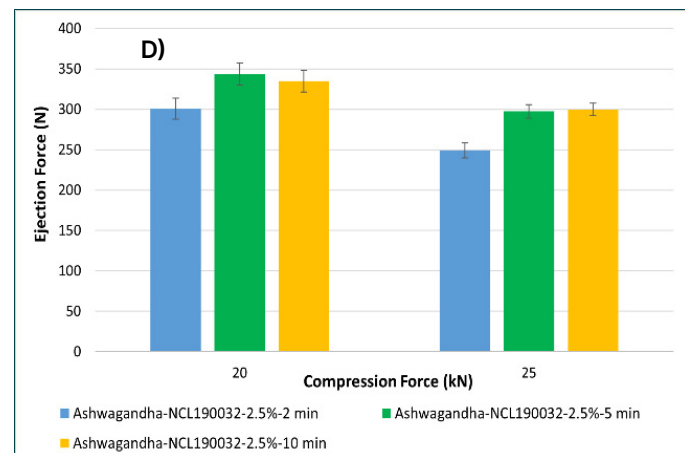
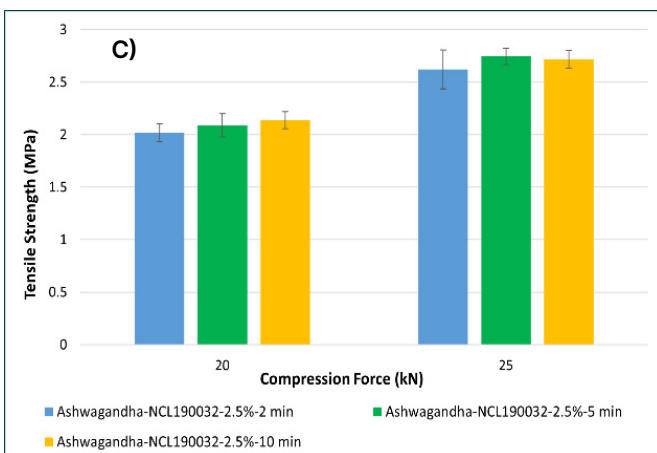
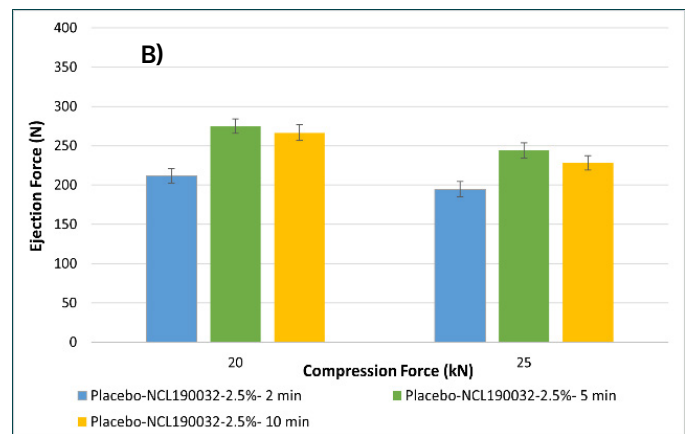
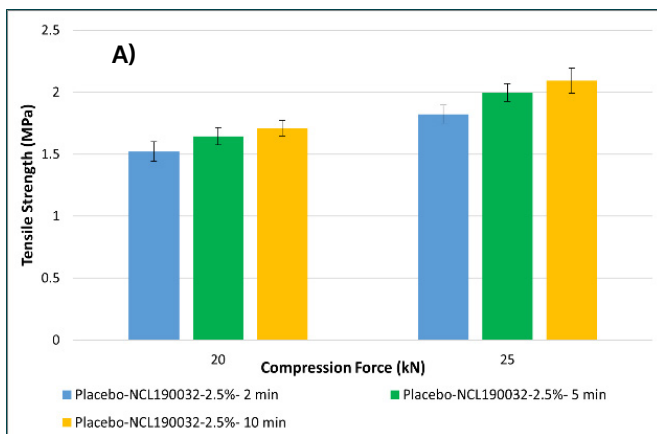
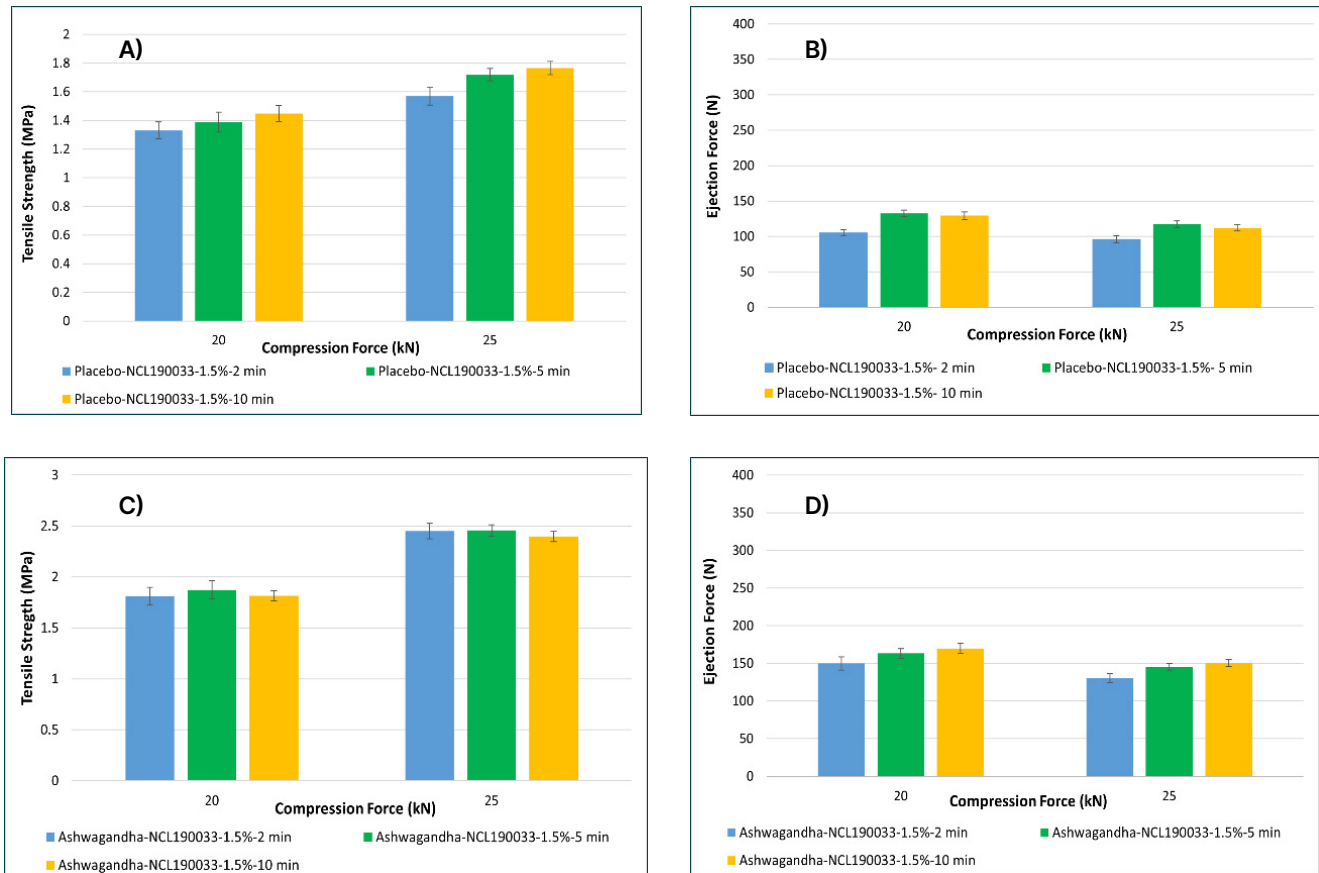


Figure 4: Impact of Lubricant Mixing Time for NCL190033 Tablet Properties A) Placebo Tensile Strength, B) Placebo Ejection Force, C) DS Tensile Strength, and D) DS Ejection Force



Conclusions

Nutraceutical lubricants NCL190032 and NCL190033 demonstrated excellent tablet ability with acceptable tensile strength and ejection force when tablets were prepared with Nutraceutical filler blend and ashwagandha.

Both lubricants showed similar tablet properties with different lubricant mixing times, concluding that the lubricant performance is independent of mixing time.

The current study demonstrates an innovative range of label friendly Nutraceutical lubricants that will meet the technical needs for nutraceutical and supplement formulations.

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