

## Rheological Study of Wheat-Chickpea Flour Blend Bread for People with Type-2 Diabetes

**Authors :** Tasleem Zafar, Jiwan Sidhu

**Abstract :** Introduction: Chickpea flour is known to offer many benefits to diabetic persons, especially in maintaining their blood sugar levels in the acceptable range. Under this project we have studied the chemical composition and antioxidant capacity of white flour (WF), whole wheat flour (WWF) and chickpea flour (BF), in addition to the effect of replacement of WF and WWF with BF on the rheological characteristics of these flour blends, with the ultimate objective of producing acceptable quality flat as well as pan-bread for the diabetic consumers. Methods: WF and WWF were replaced with BF ranging from 0 to 40%, to investigate its effect on the rheological properties and functionality of blended flour dough using farinograph, viscoamylograph, mixograph and falling number apparatus as per the AACC standard methods. Texture Profile Analysis (TPA) was carried on the WF, WWF, and their blends with BF using Stable Micro System Texture Analyzer. Effect of certain additives, such as freeze-dried amla fruit powder (*Phyllanthus emblica* L.), guar gum, and xanthan gum on the dough rheological properties were also studied. Results: Freeze-dried amla fruit powder was found to be very rich in ascorbic acid and other phenolics having higher antioxidant activity. A decreased farinograph water absorption, increased dough development time, higher mixing tolerance index (i.e., weakening of dough), decreased resistance to extension, lower ratio numbers were obtained when the replacement with BF was increased from 0 to 40%. The BF gave lower peak viscosity, lower paste breakdown, and lower setback values when compared with WF. The falling number values were significantly lower in WWF (meaning higher  $\alpha$ -amylase activity) than both the WF and BF. Texture Profile Analysis (TPA) carried on the WF, WWF, and their blends with BF showed significant variations in hardness and compressibility values, dough becoming less hard and less compressible when the replacement of WF and WWF with BF was increased from 0 to 40%. Conclusions: To overcome the deleterious effects of adding BF to WF and WWF on the rheological properties will be an interesting challenge when good quality pan bread and Arabic flatbread have to be commercially produced in a bakery. Use of freeze-dried amla fruit powder, guar gum, and xanthan gum did show some promise to improve the mixing characteristics of WF, WWF, and their blends with BF, and these additives are expected to be useful in producing an acceptable quality flat as well as pan-bread on a commercial scale.

**Keywords :** wheat flour, chickpea flour, amla fruit, rheology

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