THE EXTRUSION ROLE IN PHENOLIC COMPOUND AND PROTEIN BIOACCESSIBILITY FOR SORGHUM BASED PRODUCTS: A INFOGEST PROTOCOL-BASED STUDY

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Summary: Sorghum (*Sorghum bicolor* L.) has sustainable agronomic characteristics and represents an outstanding source of phenolic compounds (PC) and proteins compared to other cereals. The objective of this work was to evaluate how extrusion influences the PC bioaccessibility and *in vitro* protein digestibility (IVPD) in sorghum-based gluten-free products. Two different sorghum-based products were analyzed: cooked commercial

pasta and breakfast cereal and classical physical properties were determined. Free (FPC) and bound (BPC) phenolic compounds were sequentially extracted in ethanolic solution (80%), followed by alkaline and acid hydrolysis and analyzed by Folin-Ciocalteu. *In vitro* digestion was performed by INFOGEST and PC and protein bioaccessibility were determined by Kjeldahl and HPLC-DAD methods, respectively. The breakfast cereal showed the expected water absorption and solubility, and the pasta showed a solid loss and swelling compatible with gluten-free products. The cereal showed a higher PC content than pasta (4654.8±0,0 against 183.0 ±33.0 mg GAE/100 g) and BPC was the main fraction (6.5 times) in both products. After digestion, PC presented a significant reduction in cereal (44%) and pasta (76%). Seven PC were quantified in the samples by HPLC based on standards. The content of the gallic acid (53%) and caffeic acid (207%) increased after digestion, as well as the presence of catechins, identified only in the digested breakfast cereal, due to hydrolysis of condensed tannins. IVPD was determined in the remained pellet, commercial pasta showed an IVPD of 48%, while breakfast cereal was 60%. Cooking extruded product presented a higher digestibility, probably due to the improved protein solubility, facilitating the proteolysis, conferred by the thermomechanical process. The PC bioaccessibility corresponded to 60% on average, while the IVPD was about 54% in the sorghum extruded products. These results corroborated the functional and nutritional characteristics of sorghum-based products, confirming the extrusion impact on PC and protein digestibility.

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