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Improving nutritional values of chickpea husks through the extrusion process as a sustainable tool in the use of industrial biowaste as an alternative for low FODMAP diet individuals

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INTRODUCTION

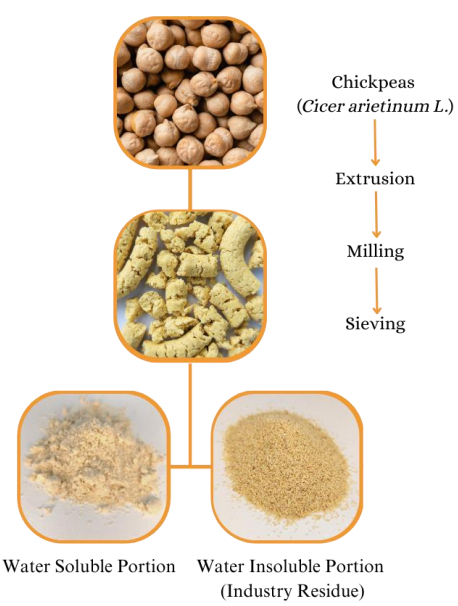
Chickpeas (*Cicer arietinum L.*) are generally consumed pure or used to prepare snacks. The outer shell of this grain is typically discarded due to its rigid texture or sold at throwaway prices for use as livestock feed due to its high fiber content[1]. Approximately 15% of chickpeas fibers are found in the husk, mostly consisting of soluble fibers, effectively aiding our body in eliminating sugars, fats, and cholesterol[2]. Extrusion is a sustainable and versatile processing technology widely utilized in the food industry. It offers several advantages, including improved digestibility, enhanced nutritional value, microbial safety and extended shelf-life of food products[3,4]. Considering that low FODMAP (fermentable oligosaccharides, disaccharides, monosaccharides and polyols) diet is designed to help people with irritable bowel syndrome (IBS) and/or small intestinal bacterial overgrowth (SIBO)[5].

OBJECTIVES

The aim of this work is to offer an alternative source of vegetable fiber from bio-waste from the chickpea-based product industry for these consumers using a sustainable process.

MATERIALS AND METHODS

Chickpeas (*Cicer arietinum L.*) were ground in knife mill (ACB Labor®). The grits obtained after this step were humidified by adding 4 % water (m / m). Then, the extrusion cooking was performed in a single screw (50 mm in diameter and 200 mm longer) extruder (Inbramaq®, IB-50) without a die plate. A single batch was prepared for each grain mixture based on a reference methodology[6]. The extruded product obtained was also ground in knife mill (ACB Labor®) to obtain the product in powder (flour), which is commonly used in the food industry. Afterward, the flour was sifted at a wire cloth test sieve (Bertel® Metal Ind. , 425 mm, 40 ASTM, 35 mesh), when the phases were separated into water soluble and insoluble portions.



RESULTS AND DISCUSSION

When we compared the fiber parameters between extruded and in natura chickpea husks, we observed that there were no significant differences between the contents (%) of Crude Fiber (6.07 and 4.98) and Acid Detergent Fiber (7.13 and 7.05) but a large difference was observed in the Neutral Detergent Fiber content (%) between the samples (12.28 and 28.33), demonstrating that the extrusion procedure considerably reduced the hemicellulose content of the chickpea husk (from 21.28 to 5.15).

CONCLUSION

These results show us that the extruded chickpea husks portion can contribute to enriching the routine of individuals who must follow the low FODMAP diet, leading authors to continue this study to develop new products for this public.

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CAPES

Considering the chosen industrial process and the valorization of the biowaste considered for this work, these two specific goals were selected: