

*Food Chem.*, **100(2)**: 756-763.

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## Air frying - A healthy alternative for conventional frying

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**B**readed and battered products are well established in both domestic as well as commercial practice. They often have high consumer value as convenient foods. The deep fat fried and pan fried products are palatable as well as highly desirable for consumers as snack foods. At the same time, excessive consumption of fried foods may cause health risks like cardiovascular diseases, hypertension, diabetes, obesity and even cancer. The estimates show that, about 20 million tons of frying fats and oils are used for frying purpose in restaurants, commercial and household practices annually. The high level of degradation products in reused oil causes major health concerns, rather than eating fat and oil fried products directly. Economic concerns like high oil requirements, oil price etc. is the main driving force behind the reuse and abuse of oil in the food processing sector. The introduction of new technology like air frying with less/no use of oil for production of fried foods pave a new dimension to the value addition of food sector. The current trend of the society to have fat-free convenient health foods also support the less oil/oil-free technology. At the same time, there exists a need to understand the technology in a scientific manner for the benefit of consumers, on health, economic and environmental aspects.

Air frying is an emerging convenient technology specially intended for domestic consumers. During the process, the product is in constant motion and contact with super-heated air flow in a frying chamber, thus the product get dehydrated and the typical crust of fried products gradually get developed. The constant motion of the product and air circulation enables the uniform

cooking of ingredients from all the angles. The present study aims to understand the possibility of air frying as an alternative technology for conventional frying method.

The experiment was conducted to optimize the process parameters such as frying time, and temperature with a two factorial central composite design in Response Surface Methodology (RSM). The overall acceptability of air fried fish fingers prepared from *Pangasius* fish fillets were statistically optimized with 13 different combinations. The sensory characteristics of the products with different combinations were evaluated for its quality attributes like colour, taste, appearance, flavour and overall acceptability; on a 9-point hedonic scale keeping 9 for excellent and 1 for very poor as per the method of Murray *et al.* (2001).

The desirable optimum combination of temperature and time for air frying was found to be 190 °C for 16 min. (Fig.1). The product was then further compared with deep fat fried fish fingers with already established optimum conditions (180 °C for 3 min. - Tokur *et al.*, 2006, Zhang *et al.*, 2012, Sebedio *et al.*, 1993) and found that both products got similar acceptability as assessed by the sensory panellists.

The proximate composition analysis indicated significant difference in moisture and fat content of air fried and deep fat fried fish fingers. The higher moisture content (43.67%) in air fried fish fingers compared to deep fat frying (26.33%) may be due to longer frying time in air frying compared to deep fat frying. Lower moisture content in deep fat fried product in turn resulted in a higher fat

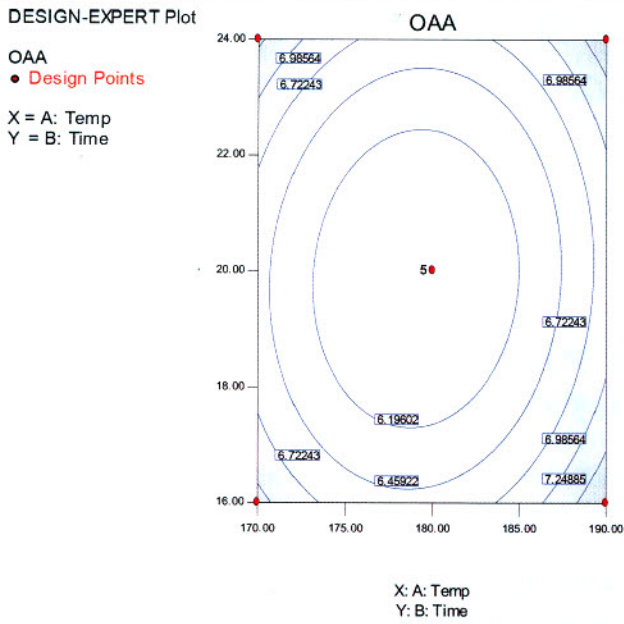


Fig 1. Contour plot of optimization of air frying for fish fingers

content (21.29%) than air fried ones (8.40%). The protein and ash content had shown no significant difference in frying methods irrespectively. ( $P < 0.5$ )

Various reactions occurring during frying process like denaturation of protein, starch gelatinization, browning of batter and breading system etc. affects the crust formation and the colour of the fried product. The results obtained showed that air fried fish fingers have lighter colour than deep fat fried (Fig. 2). The redness values ( $a^*$ ) showed no significant difference while the yellowness ( $b^*$ ) was found to be higher for air fried product. The texture profile analysis of products showed that air fried products were having higher springiness and chewiness values which indicates the superior juiciness and mouth feel sensation of the product.

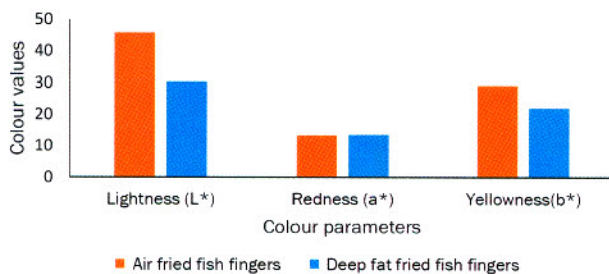
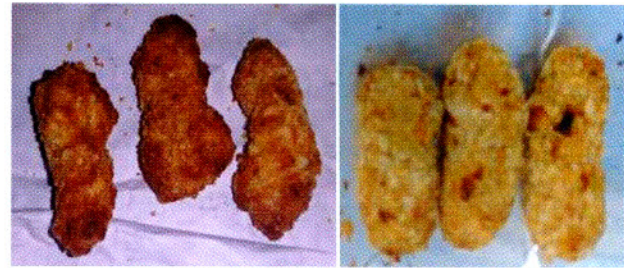


Fig 2. Colour parameters of air fried and deep fat fried fish fingers ( $p < 0.05$ )



Deep fat fried fish fingers      Air fried fish fingers

Major attraction of this technology is its economic viability. When compared with the huge volume of oil requirement in conventional deep fat frying, air frying requires only 3% oil. Hence it can be concluded that, air frying technology provides fast, effortless, safe frying with easy clean up and healthy food than other frying technologies.

**Acknowledgements:** This work was done at Defence Food Research laboratory (DFRL), Mysuru during the Professional Attachment Training of the first author. Thanks are due to Dr. M.C. Pandey, Scientist G, Department of Freeze Drying and Animal Products Technology, DFRL, Mysuru for his valuable suggestions during the research work.

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