MedCrave
Step into the World of Research

Journal of Nutritional Health & Food Engineering

Effect of Hydrocolloid Compound at Less Oil of French Fries Potato

Abstract

The use of coating agents is one effective way to reduce oil absorption in fried products. Reducing the fat content of fried foods by application of coatings is an alternative solution to comply with both health concerns and consumer preferences. The aim of this study was to analyze the effect of hydrocolloids as coating agent on the quantity of oil uptake and on sensory attributes of potato chips. The effect of the coating composition showed that the minimum fat content was related to 1% carboxymethyl cellulose (CMC), 0.5% xanthan, 0.3% guar and 1% xanthan with 21.2, 21.7, 22.4 and 24.8%, respectively, and the highest of fat content was related to blank sample (non-coated), 2% tragacanth, 0.5% guar gum with 49.4, 41.7 and 33.2% of oil content, respectively (p ,0.05). The most effective coating agent reduced the oil uptake by 57.03, 55.94, 54.67 and 49.71%, respectively (p ,0.05). Sensory evaluation showed that the best color was related to 1% CMC, 0.3% guar and 2% tragacanth, and with respect to flavor evaluation the best flavor was observed in tragacanth 2%, CMC 0.5% and CMC 0.1%, and the best texture referred to tragacanth 2%, CMC 0.5% and CMC 1%. In sensory evaluation, all coated chips got high scores compared with blank (non-coated chips) samples (p ,0.05).

Keywords: Hydrocolloid; Low fat; French fries potato

Review Article

Volume 2 Issue 4 - 2015

Habib O Mirzaei[1]*, Fatemeh Salehi[2], Hajar Garoumi[3] and Franak Farhadpour[4]

[1]*Aristotle University of Thessaloniki, Greece*

[2]*Shahroud Islamic Azad University, Iran*

[3]*Azadshahr Islamic Azad University, Iran*

[4]*Sari Islamic Azad University, Iran*

***Corresponding author:** Habib O Mirzaei, Aristotle university of Thessaloniki, no 133.olibidoze street, Tel: +306951396398; Email: mirzaeihabib1@gmail.com

Received: May 22, 2015 | **Published:** September 11, 2015

Abbreviations: CMC: Carboxymethyl Cellulose; MC: Methyl Cellulose; SPI: Soy Protein Isolate

Introduction

Overweight and body fat greatly increase the risk of adverse health consequences. Despite the shift in eating patterns to low-fat foods, especially those low in saturated fats to reduce the risk of heart disease, people still consume high levels of fried foods because they are more tasty and easier to prepare Daraei et al. [1]. Ways of reducing fat absorption during frying are mentioned as below: use of pre-drying before frying, frying under hightemperature and short-time conditions, and use of an edible film as coating agent M. K. Krokida [2].

Thus, reducing the fat content of fried foods by application of coatings is an alternative to comply with both health concerns and consumer preferences.

E.F. Shih [3] investigated the effects of 11 hydrocolloid materials, including gelatine, gellan gum, k-carrageenan-konjac-blend, locust bean gum, methyl cellulose (MC), microcrystalline cellulose, pectin (three types), sodium caseinate, soy protein isolate (SPI), vital wheat gluten, and whey protein isolate. Their results showed that all coating agents reduced oil absorption in comparison to blank samples Worapong Usawakesmanee [4].

Several groups have studied the properties of different coatings to reduce oil migration E. F. Shih [3]. Hydrocolloids with thermal gelling or thickening properties, like proteins and carbohydrates, have been tested.

P. Mallikarjunan found that MC films reduced fat uptake more than hydroxypropyl cellulose and gellan gum films applied to a pastry mix. Mallikarjunan et al. [5] stressed that, in products coated with cellulose derivatives, a protective layer is formed on the surface of the samples during the initial stages of frying due to thermally induced gelation above 60 7C. This protective layer retards the transfer of moisture and fat between the sample and the frying medium. Researchers tested different cellulose derivatives for coating formulations to reduce the oil uptake of fried products. The coating application did not modify either the texture characteristics or sensory properties of the fried samples. MC coating formulations were the most effective, reducing the oil uptake by 35–40%, depending on the product. The oil barrier properties of the coating depend on the formation of a uniform layer.

The problems connected with determination of factors influencing on the texture of fried products were also focused on, as the researchers attempted to determine the effect of the type and quality of the frying medium, as well as the parameters of frying, on the value of this qualitative distinguishing feature Worapong Usawakesmanee [4]. French fries and crisps belong to the most popular products obtained from potatoes. The name “potato French fries” refers to an intermediate product or a ready product reaching the market in a fried form, prepared by blanching and frying in the oil strip-shaped potatoes of different thickness, sliced potatoes, crescent-shaped potatoes, or the whole tubers. Crisps are thin slices of potato, fried in oil or fat until their moisture is below 2%.

The quantity of fat absorbed during frying depends on a number of factors - both the ones connected with raw material (potato chemical composition as well as type and quality of a frying oil) and technological factors. Analyzing the influence of potato chemical composition on fat content in potato products, it was possible to state that the higher dry matter and starch content in potato tubers, the lower fat content characterized the final products. The amount of absorbed fat depends, to a high degree, on the shape and size

of fried elements by considering this, the objective of this work is to present and discuss effect of several hydrocolloids on less oil of french fries potato.

Results and Discussion

The effect of coating composition showed that minimum fat content was related to 1% CMC, 0.5% xanthan, 0.3% guar and 1% xanthan with 21.2, 21.8, 22.4 and 24.8%, respectively, and the highest fat content was related to blank sample (non-coated), 2% tragacanth, 0.5% guar gum with 49.4, 41.7 and 33.2% of oil content, respectively (p ,0.05).

The most effective coating agent reduced the oil uptake by 57.0, 55.9, 54.7 and 49.7%, respectively. Sensory evaluation showed that the best color was related to 1% CMC, 0.3% guar and 2% tragacanth, and with regard to flavor evaluation the best flavor was observed in tragacanth 2%, CMC 0.5% and CMC 1%, respectively (p ,0.05) . Best texture refers to tragacanth 2%, CMC 0.5% and CMC 1%. In sensory evaluation, all coated samples got high scores in comparison with blank sample xanthan 0.5%, tragacanth 1% and CMC have the highest decrease in water loss and xanthan 1%, CMC 0.5% and tragacant 2% have the lowest decrease in water loss (p ,0.05). For blank samples, and xanthan 1% and guar 0.3%, the water loss during frying showed the greatest value and xanthan 0.5% and guar 0.5% showed the lowest amount (p ,0.05) Daraei et al. [1].

Coating intake for tragacanth 2% and 1% and CMC 1% was at the maximum amount and the lowest coating intake was observed in guar 0.3% and 0.5% (p <0.05).

The best hydrocolloids for coating according to the Index value were xanthan 1%, guar 0.3%, CMC 1% and 0.5% and the worst hydrocolloids by this respect were tragacanth 2%, guar 0.5% and tragacanth 1% (p <0.05) Daraei [1]. All hydrocolloids increased the water content compared to the blank samples, and due to this increase, the dry matter of coated chips was less than that of the non-coated ones Fat and moisture transfer through edible coatings in a product during frying. Film type Decrease in water loss due to coating water loss during frying Water increase due to coating.

Conclusions

The correlations, determined so far, indicate that both the type of a frying medium and the temperature of frying affect formation of this qualitative parameter. Nevertheless, further research, particularly model tests involving frying media of more diverse structure, should definitely be conducted. Determination of correlation between the structure of the fried products and the type of the frying medium can also be an interesting subject of investigation. With regard to the results of fat content and index value, CMC 1% was the best gum for coating, but with respect to sensory evaluation, tragacanth 2% was the best treatment. By considering both results of oil uptake and sensory evaluation, CMC 1% was suggested as the best gum for coating potato chips (p ,0.05) [6-9].

References

1. Daraei Garmakhany A, Mirzaei HO, Kashani Nejad M, Maghsudlo Y (2008) Study of oil uptake and some quality attributes of potato chips affected by hydrocolloids. Eur J Lipid Sci Technol 110(11): 1045-1049.
2. Krokida MK, Oreopoulou V, Maroulis ZB, Marinos KD (2001) Effect of pre-drying on quality of French fries. J Food Eng 49(4): 347-354.
3. Shih EF, Daigle KW, Clawson EL (2001) Development of low oil uptake donuts. J Food Sci 66(1): 141-144.
4. Usawakesmanee W, Wuttijumnong P, Chinnan M, Jangchud A, Raksakulthai N (2005) The Effects of Edible Coating Ingredient as a Barrier to Moisture and Fat of Fried Breaded Potato. Kasetsart(Nat. Sci.) 39: 98-108.
5. Mallikarjunan P, Chinnan MS, Balasubramaniam VM, Phillips RD (1997) Edible coatings for deep-fat frying of starchy products. Lebensm Wiss Technol 30(7): 709-714.
6. Kita A (2014) The effect of frying on fat uptake and texture of fried potato products, Eur J Lipid Sci Technol 116(6): 735-740.
7. Krokida MK, Oreopoulou V, Maroulis ZB (2000) Water loss andoil uptake as a function of frying time. J Food Eng 44(1): 39-46.
8. Mellema M (2003) Mechanism and reduction of fat uptake in deepfat fried foods. Trends Food Sci Technol 14(9): 364-373.
9. Balasubramaniam VM, Chinnan MS, Mallikarjunan P, Phillips RD (1997) The effect of edible film on oil uptake and moisture retention of a deep-fat fried poultry product. J Food Proc Eng. 20(1): 17-29.

Citation: Mirzaei HO, Salehi F, Garoumi H, Farhadpour F (2015) Effect of Hydrocolloid Compound at Less Oil of French Fries Potato. J Nutr Health Food Eng 2(4): 00062. DOI: 10.15406/jnhfe.2015.02.00062