http://www.pjbs.org

PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 3 (12) 2208-2209, 2000

Effect of Chicken Frying on the Characteristics of the Canola Oil

Nadia Khan and Haq Nawaz
Department of Chemistry, University of Agriculture, Faisalabad-38040, Pakistan

Abstract: An experimental study was conducted to evaluate the effect of chicken frying on physico chemical characteristics of canola oil. Various physico-chemical parameters of the frying oil were determined. The results revealed that viscosity, refractive index, specific gravity, acid value, peroxide value and saponification value increased with frying time however the iodine value decreased with increasing frying time during frying of chicken pieces. It was concluded that extensive heating and continuous frying should be avoided.

Key words: Canola oil, chicken frying, iodine value, acid value, peroxide value, saponification value, viscosity, refractive index and specific gravity etc

Introduction

Fats and oils are necessary constituents of our food since early ages. Fats and oils are one of the three major classes of food products. Oils may be defined as physically greasy to touch and liquid at room temperature. Frying oils are refined, bleached, winterized and deodorized with the exception of virgin olive oil. Deep frying is a process of rapid food preparation (Mancini-Filho *et al.*, 1986). In deep frying process some burnt food particles remain in the oil and are consumed with fried food resulting toxicity in man.

Canola oil (*Brassica napus*) is improved rapeseed oil with low levels of erucic acid and glucosinolates (Shahidi and Gabon, 1989). The first double low rapeseed contains less than 5% erucic acid and not more than three milligrams (0.3%) of glucosinolate per gram of dry meal (Vaisey and Eskin, 1982). Canola oil contains 55% of mono-unsaturated fatty acids, oleic acid, 25% linoleic acid, 10% polyunsaturated fatty acids (PUFA) and only 4% saturated fatty acids (SFAS). Canola oil is most widely used in Canada and has been approved for generally recognized as safe (GRAS) by the food and drug administration (FDA) of United States of Health and Human Services (Dupont *et al.*, 1989).

Keeping in view the importance of canola oil as for edible purposes the present project was undertaken to study the effect of chicken frying on the physico-chemical characteristics of the oil.

Materials and Methods

Canola oil was taken from a general store. The research work was done in Department of Chemistry, University of Agriculture, Faisalabad.

Frying Treatment: The chicken pieces were fried in canola oil at 200 ± 5°C in an open non stick pan for 5 hours. During frying the oil samples (150 ml approximately) were collected after 1, 2, 3, 3½, 4, 4½ and 5 hours and analysed for the physical and chemical analysis to evaluate the changes caused by frying. Besides the samples of different time intervals the original samples and come-up temperature (12.5 minutes) were also analyzed. The observation for each heating time was recorded in triplicate. Data obtained was then subjected to appropriate statistical analysis by the method of Steel and Torrie (1992). Each sample was analysed for the physical and chemical characteristics according to standard methods of (A.O.A.C., 1990).

Results and Discussion

The results of physical parameters are shown in Table 1. The results showed that specific gravity, refractive index, viscosity increased with increasing time period of frying. These results are in close agreement with findings of Al-Zamily and Al-Hakim (1987) and Aneela *et al.* (1999) who reported an increase in specific gravity, refractive index and viscosity of some fats (bind, corn and raee) during deep fat frying of potato chips at 180 ± 5°C for 90 hours.

The results of chemical parameters are shown in Table 2. The results showed that acid value, saponification value, peroxide value increased with increasing time period of frying. These results are in close accordance with results of Malolepszy (1981), Coll-Hellin and Clasell (1985). The saponification value of original sample of canola oil was found to be 156.52. These values are greater than 123.06 for high erucic acid (*B. oleracea*) seed fat as reported by Kaul *et al.* (1980). The higher saponification values

Table 1: Changes of physical characteristics of the Canola oil during frying at different time intervals

			Time Intervals						
Physical Characterstics	O.S.	C.U.T.	1	2	3	3½	4	4½	5
Specific gravity	0.9180F ±0.0001	0.9186DE ±0.0001	0.9185E ±0.0001	0.9188D ±0.0001	0.9195c ±0.0001	0.9198C ±0.0001	0.9223B ±0.0001	0.9189CD ±0.0001	0.9257A ±0.0001
Refractive index	1.677G ±0.00	1.687F ±0.00	1.679DE ±0.00	1.680CD ±0.00	1.679DE ±0.00	1.682BC ±0.00	1.681BC ±0.00	1.683AB ±0.00	1.684A ±0.00
Viscosity	5.271 ±0.01	5.93H ±0.01	6.27G ±0.01	6.98F ±0.01	7.47E	7.62D ±0.01	7.91C ±0.01	8.63B ±0.01	10.32A ±0.01 ±0.01

C.U.T. come up temperature = 12.5 minutes
O. S.Original solution

Table 2: Changes in chemical characteristics of the Canola oil during frying at different time intervals.

Chemical characterstics	Time Intervals								
	O.S.	C.U.T.	1	2	3	3½	4	4½	5
Acid value	2.201 ±0.01	2.36 ±0.01	2.88G ±0.01	3.06F ±0.01	3.20E ±0.01	3.27D ±0.01	3.46C ±0.01	3.86B ±0.01	4.54A ±0.01
Saponification Value	156.521 ±0.01	169.15H ±0.01	173.73G ±0.01	179.32F ±0.01	189.93E ±0.01	194.18D ±0.01	196.54C ±0.01	198.66B ±0.01	203.14A ±0.01
Idoine value	109.53I ±0.02	107.4G ±0.02	103.3G ±0.02	101.3F ±0.02	96.66E ±0.02	94.33D ±0.02	91.86C ±0.02	87.08B ±0.02	84.25A ±0.02
Periodic value	8.8A ±0.02	10.6B ±0.02	13.3C ±0.02	15.4D ±0.02	17.6E ±0.02	18.35F ±0.02	19.8G ±0.02	22.4H ±0.02	24.1I ±0.02

C.U.T. come up temperature = 12.5 minutes
O. S.Original solution

for canola oil are due in part to lower erucic acid i.e., replacement of long chain fatty acid like erucic acid ($C_{22:2}$) by C_{18} fatty acid. These results are very close to the findings of Borrowski and Ratkiavicz (1985) who reported an increase in saponification value from 198.7 to 219.9 mg KOH/g after heating and frying of soyabean oil at different temperature (163°C-180°C) at times (25-540 minutes).

An iodine value of 61.2 was reported by Kaul *et al.* (1980) for high erucic acid (*B. oleracea*) seed fat as compared to 109.53. These higher values of canola oil are due in part to a replacement of erucic acid with oleic acid together with smaller increase in linoleic acid ($C_{18:2}$) and linolenic acids. The development of linoleic acid ($C_{18:2}$) reduce the iodine value as reported by Vaisey *et al.* (1982). The peroxide value was found to be 8.8. These values are in close agreement with peroxide values of 10 for low erucic acid rapeseed oils as reported by Vaisey *et al.* (1982). These results are in close agreement with findings of Tehmina (1996) Saadia (1997) and Aneela (1999).

The above results indicated that frying of all samples of canola oil produced significant physical and chemical changes which cross the border of safety and toxicity. Such type of toxicity is reported by Chang *et al.* (1978) so we should avoid extensive heating and continuous frying as much as possible if we want to secure our health.

References

A.O.A.C., 1990. Official methods of analysis. The association of official analytical chemists. Arlington Virginia U.S.A.

Al-Zamily R. and S. Al-Hakim, 1997. Evaluation of local commercial fats and oils for deep frying of potato chips. Iraq J. Agric. Sci. Zanco, 5: 113-124.

Aneela, I., H. Nawaz and S. Yasmin, 1999. Quality evaluation of Canola oil during deep fat frying. Pak. J. Bio. Sci., 2: 967-968.

Borrowask, J. and W. Rotkiewiz, 1985. Change in soyabean oil during deep frying TLUZCZJ Jadalave, 23: 22-28.

Chang, S.R.J., 1978. Peterson of foods. J. Amer. Oil Chem. Soc., 55: 778-728.

Coll-Hellin, L., M. Del.P. and Rueda Clausell, 1985. Effect of fat frying on the composition of the lipid fraction eaten in Spain. Analesde-Bromatologia, 36: 207-224.

Dupont, J., P.J. White, K.M. Johnston, H.A. Heggtveit, B.E. Medonald, S.M. Grundy and A. Bonanome, 1989. Food safety and health effect of Canola oil. J. Am. Oil Nutr., 8: 360-375.

Kaul, V.K., A. Banerjee and S.S. Nigam, 1980. Chemical investigation of the seeds of *Brassica Oleracea* Var. Acephala. J. Am. Oil Chem. Soc., 57: 199-201.

Malolepszy, B., 1981. Effect of heating time on quality changes in fats for production of frozen fried chips. Chlodinctiwo, 16: 20-22.

Mancini-Filho, J.L., M. Smith, R.K. Creveling and H.F. Al-Sheikh, 1986. Effect of selected chemical treatments on quality of fats used for deep frying. J. Amer. Oil Chem. Soc., 63: 1452-1456.

Saadia, F., 1997. The effect of frying on the quality of Maize oil. M.Sc. Thesis, Deptt. Chem. Univ. of agriculture, Faisalabad.

Shahidi, F. and J. Gabon, 1989. Effect of methanol ammonia water treatment on the concentration of individual fluxosinolates of Canola. J. Food Sci., 54: 1306-1317.

Steel, R.G.D. and J.H. Torrie, 1992. Principles and procedures of statistics. McGraw Hill Book Co. Inc., New York.

Tehmina, R., 1996. Thermal degradation of newly evolved varieties of rapeseed oil (Peda, Raya, Anmol, RL18). M.Sc. Thesis, Univ. Agri., Faisalabad.

Vaisey, M. Genser and N.A.M. Eskin, 1982. Canola oil properties and performance canola council of Canada 301-433. Main Street Winnipeg Manitoba, R3B-IB3.