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EFFECT OF VARIOUS SOLVANTS ON POLYPHENOLIC CONTENT OF POTATO PEELS

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Abstract—*The total phenolics content of potato peel extracts of five different solvents (water, ethanol, hexane, methanol and acetone) and two solvent extraction methods (Solvent and ultrasound-assisted) were studied. The content of total phenolics in the extracts was determined spectrometrically according to the Folin-Ciocalteu procedure and calculated as gallic acid equivalents. Antioxidant activity of methanolic extracts was determined by using the Oven (60°C) and Rancimat (80,110,140°C) methods on refined soybean oil and compared with the effects of synthetic antioxidants (BHA, BHT and TBHQ). Peroxide values and 2-thiobarbituric acid values were used to assess lipid peroxidation. The greatest amount of extract was obtained with water but the greatest amounts of phenolic acids resulted when potato peels was extracted with methanol. Using ultrasound improved the total phenolic compounds of the potato peel extract. After 15 days storage at 60°C, 5.00g of soybean oil containing either the methanolic extract (800, 1600 ppm) or BHA (200 ppm) and BHT (200 ppm) reached peroxide values (PV) of 37.35, 24.65, 33.20 and 28.88 meq/kg respectively.*

Keywords*: Potato extracts %, Lipid peroxidation %, Ultrasound %,Phenolics % and Soybean oil*

INTRODUCTION

Oil oxidation is a free radical chain process leading implicated in many health risks, including cancer and to the deterioration of oil and lipid containing materials carcinogenesis (Sashidhara, et al., 2006; Sacchaetti, et al., 2005;Hou, 2003; Prior, 2004). In foods, these reactions can lead to rancidity, Phenolic compounds are the main class of natural loss of nutritional value from the destruction of antioxidants (Atoui, et al., 2005; Emad, 2006; Kamal-Eldin, and Appleqvist, 1996). Therefore as sources of natural vitamins (A, D and E) and essential fatty acids and the antioxidants much attention is being paid to plants and possible formation of toxic compounds and colored other organisms(Zia-ur-Rehman, et al., 2004). Thus interest in natural antioxidant, especially of plant origin, has greatly increased in recent years (Jayaprakasha, and Rao, 2000).The present was planned to study the antioxidant potency of polyphenolic compounds from potato peels.

MATERIALS AND METHODS

Reagents: Refined, bleached and deodorized soybean oil was obtained from a local refinery. Potato tubers collected from local market of Hisar,Haryana.Chemicals and reagents were of analytical grade and were purchased from Merk Chemical CO.

Oven Test Method:

The oven test method at 63°C.Tubers were washed, peeled and then the used to check stability. Oxidation was periodically peels were dried and then ground to give 40-mesh size assesed by the measurement of peroxide value and powder. Synthetic antioxidants, namely butylatedthiobarbituric acid value, according to the AOCS method hydroxyanisole (BHA), butylatedhydroxytoluene (BHT).All the experiments were carried out in triplicate and tertiary butylhydroquinone (TBHQ) were purchased the results were averaged. All chemicals and solvents were of analytical grade and obtained from Merk Chemical Co.

Ultrasonic Extraction:

The ultrasound assisted extraction Samples of extracts dissolved in soy bean oil at a procedure was used for the extraction of potato peel with concentration range from 200 to 2400 ppm were heated at different solvents (methanol, ethanol, hexane, acetone 90, 120 and 150°C. BHA, BHT and TBHQ were added to and water). Thus 20 ml of solvent were added to 1 g of soy bean oil, giving a final concentration of 200 ppm and powdered peels, the mixture was sonicated in a n tested at the same conditions. A continuous air stream ultrasonic bath for 15 min. The extract was filtered through (20 L hG) at ambient condition was passed through the wathman No.42 filter paper for removal of peel particles heated samples and the volatile compounds were and then centrifuged at 3000 × g for 10 min at 5°C and absorbed in a

conductivity cell. The conductivity was stored in a refrigerator (Sotillo et al., 1994).

Solvent Extraction:

10 g of ground peels were extracted by mixing using a magnetic stirrer, with 200 ml of methanol Statistical Analysis: Experimental data was analysed at room tempratureovernight. The extract was filtered using wathman No.42 filter paper and the residue was re-extracted under the same conditions. The combined filtered was evaporated in a rotary evaporator below 40˚C. Then centrifuged at 3000× g for 10 min. at 5˚C and stored in a refrigerator (Sotillo et al., 1994).

RESULTS AND DISCUSSION

Determination of Total Phenolics:

The concentration of Extraction:

The percentage yield of potato phenolics in the extracts was determined and results were expressed as gallic acid equivalents per gram dry weight of sample (GAE/gdw).Peels with different solvents; i.e. methanol, ethanol, hexane, acetone and water and refluxing ground potato Five milligrams of each dried potato peel extract was peels with methanol. The maximum amount of potato peels dissolved in a 10 ml mixture of methanol and water extract (11.2 %) was obtained with water followed by (6:4 v/v). Samples (0.2 ml) were mixed with 1.0 ml of 10- methanol (7.9 %) and ethanol (5.6 %). Higher percentage fold-diluted Folin-Ciocalteu reagent and 0.8 ml of 7.5% yield were obtained with an increase in polarity of the sodium carbonate solution; after standing for 30 min at solvents. It seems the changes in the extraction room temperature; the absorbance was measured at 765 nm.

Total Phenolic Content:

The concentration of phenolics in the extracts, expressed as µg GAE/g sample, was dependent on the solvent and method used in the extraction. The amount of phenolic compounds in the methanolic extract was highest and total phenolic concentrations in the five solvents were in the order: methanol > water > ethanol >aceton> hexane Potato peel contains many phenolic compounds, some in free form and some bound. The major phenolic acids in the potato peel extract were identified as chlorogenic acid(CGA), gallic acid (GAC), protocatechuic acid (PCA) and caffeic acid (CFA) (Sotillo et al., 1994). Sonication improved the total phenolic compounds of the methanolic extract of potato peels and shortened the extraction times. Therefore, antioxidant activity of the extract of highest phenolic compounds(methanol) was tested in refined soybean oil at 63, 90, 120 and 150°C.

Effect of Addition of PPE on the Stability of Soybean Oil:

The PPE was used at levels of 200, 800, 1600 and 2400 ppm and synthetic antioxidants (BHA, BHT and TBHQ) were added at 200 ppm, because the latter were pure compounds whereas the former was complex mixtures 1600 ppm.

The addition of natural and synthetic antioxidant to soybean oil affected, to different degrees, the peroxide and TBA values during accelerated oxidation at 63°C for 16 days. Peroxide value (PV) measures primary products of lipid oxidation and TBA value measures the formation of secondary oxidation products, mainly malonaldehyde, which may contribute off-flavourto oxidized oil. All samples with PPE level added at 200-2400 ppm were more stable on heating at 63°C than the control, when assessed by the change in peroxide and TBA values. Effect of PPE increased with concentration and the antioxidant activity at concentrations of 800 and 1600 ppm were not significantly different ($p < 0.05$) from that of the synthetic antioxidants (BHA and BHT) at levels of 200 ppm but always TBHQ showed higher antioxidant activity than the all levels of PPE concentrations. Similary, there was no significant difference in peroxide and TBA values when the amount of potato peel extract in soybean oil was increased from 200 ppm to 800 ppm and from 1600 ppm to 2400 ppm. But there was a significant difference in peroxide and TBA values when the amount of potato peel extract in soybean oil was increased from 800 ppm to 1600ppm.

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