A COMPARATIVE STUDY OF OXIDATIVE STABILITY OF EXTRA VIRGIN OLIVE OIL, VIRGIN COCONUT OIL AND GRAPE SEED OIL UPON HEAT TREATMENT AND STORAGE

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2010

ABSTRACT

Extra virgin olive oil (EVOO), virgin coconut oil (VCO) and grape seed oil (GSO) have relatively high smoking points among vegetable oils and representing three different classes of fatty acids; EVOO contains mostly monounsaturated fatty acids; VCO contains mostly saturated fatty acids while GSO contains mostly polyunsaturated fatty acids. The aim of this research is to investigate oxidative stability of EVOO, VCO and GSO upon thermal treatment and up to 100 days storage. EVOO, VCO and GSO were heated at 190°C with french fries and storage up to 100 days. The changes of fatty acids composition were determined by gas chromatography (GC). Oxidative stability of EVOO, VCO and GSO were evaluated based on changes in iodine value (IV), free fatty acid (FFA) content, peroxide value (PV), p-anisidine value (p-AV) and total oxidation (Totox) value. The degradation of phenolic content was determined by Total Phenolic Content (TPC). Results from GC showed that three oils only had slight changes of fatty acid content after storage. IV of the three oils decreased, percentage loss in VCO was the highest (82.57%), followed by GSO (40.18%) and EVOO (9.92%). VCO contained high FFA initially. There was significant increased ($p<0.05$) in FFA contents in EVOO, VCO and GSO after 100 days storage when compared with 0 day with similar rate. EVOO showed more heat resistant since there was no significant difference in FFA contents after heat treatment. In PV, there was significant increased ($p<0.05$) after heat treatment (0 day) in these three oils. However, there was no significant changed in PV of EVOO after 50 days storage. After 100 days storage, EVOO showed significant increased ($p<0.05$) in PV. VCO showed significant difference at 50 days storage but no significant changed after 100 days storage. GSO showed significant changed in PV after heat treatment (0 day), 50 days and 100 days storage. The lowest rate of increased in PV was EVOO, which was around 5 times than initial PV, followed by VCO and the highest was GSO, which was around 10 times of initial PV. After heat treatment (0 day), p-anisidine value of these three oils significantly increased ($p<0.05$). The p-anisidine value of EVOO showed no significant changed in 50 days but showed significant changed in 100 days. There was no significant changed in VCO after 50 days and 100 days storage. The p-anisidine value of GSO showed significant changed after heat treatment (0 day), 50 days and 100 days storage. VCO contained the lowest Totox value, followed by EVOO, while GSO contained the highest Totox value. The phenolics content of fresh EVOO was the highest and VCO was the lowest. The phenolics content of fresh EVOO, VCO and GSO were 15.84±0.56, 0.66±0.02, and 2.20±0.04 mg GAE per 100g of oil, respectively. Percentage loss in TPC of GSO in the end of study was the highest (91.82%), followed by EVOO (73.17%), and VCO (53.10%). As a conclusion, EVOO showed the highest oxidative stability when compared with VCO and GSO.