Studies on some fish oils

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Due to the importance of fish as a source of healthy oil, fish and its products should be characterized with high quality to obtain and consume fish oil with high quality. Processing, cooking method and storage condition may be affecting the quality of fish oil because of the high content of unsaturated fatty acids in its structure. Therefore, this study was conducted to evaluate the effects of some different processing, cooking methods and storage conditions on the different quality attributes of fish oil. The results of this study could be summarized as follows:I- Smoking o fish: A-Chemical properties:The frozen herring fish used for processing of smoked herring recorded 70.69 %, 10.71 % and 0.45 mg malonaldehyde/kg for moisture, fat and thiobarbituric acid (TBA) value, respectively (on wet weight). Meanwhile, immediately after smoking of herring (zero time), the moisture content of all the smoked herring decreased (54.72-57.55 %, according to smoking method) than that of raw frozen herring (70.69 %). Cold-smoked herring recorded the lowest (54.72 %) moisture content followed by hot-smoked herring (56.62 %) and liquid-smoked herring that recorded the highest (57.55 %) moisture content.Due to storage either at room temperature 25 °C or at cold (4 °C), the moisture content of liquid-, cold-and hot-smokedherring decreased with increasing of storage time provided that such loss was pronouncedly retarded when the storage temperature decreased from 25 °C to 4 °C.The raw frozen herring contained 36.54 % of fat (on dry weight). By different smoking methods, the fat content increased (on wet weight) nevertheless, it decreased on dry weight basis where, the fat contents decreased from 36.54 in raw herring to reach 25.87, 29.11 and 25.70 % in liquid, cold and hot-smoked herring, respectively. During storage, the fat content of all the smoked samples (either at room temperature 25 °C or at cold 4 °C decreased until the end of storage periods, (on dry weigh).Thiobarbituric acid (TBA) contents of frozen herring was 1.54 mg malonaldehyde / kg sample, but immediately after smoking (zero time), the liquid-smoked herring recorded lower TBA value (1.58) than the hot and cold-smoked herring which had values of (1.66 and 1.94 mg malonaldehyde/kg sample, respectively on dry weight basis). During storage at room temperature, the TBA values of all the smoked herring were increased by the increasing of storage time but, by the end of storage, the hot-smoked herring had lower (4.6 malonaldehyde/kg sample, more oxidation) TBA values dry than cold (6.43 malonaldehyde/kg) and liquid-smoked (8.05 malonaldehyde) herring on dry weight basis. TBA values of smoked herring stored at 4 °C were lower than those stored at room temperature.Total phenols were not detected in raw frozen herring fish. By smoking with different methods, the cold-smoking herring had the higher content of phenols than liquid and hot-smoked herring. Phenols content was decreased to reach to 33.82, 17.77 and 9.16 mg/100g sample at the end of storage for 30 days at room temperature for cold, liquid and hot-smoked herring respectively (on dry weight basis). The values by the end of storage at 4 °C for 90 days were 52.46, 40.07 and 29.07 mg/100 g samples, respectively.B- Oil constants:Refractive index (RI), acid value (AV), free fatty acid (FFA, as oleic acid), peroxide value (PV), saponification value (SV) and iodine number (IN) of oil extracted from raw frozen herring fish, were 1.4702, 1.64, 0.83, 4.32, 203.13 and 135.75, respectively. Immediately after smoking (zero time), the results showed that RI, PH and IN decreased while, AV, FFA, PV and S.V increased for all smoked herring samples liquid, cold or hot-smoked herring. By the end of storage either at 25 °C or 4 °C, the cold-smoked herring oil was more stable when compared with liquid and hot-smoked herring oils, respectively. Nevertheless, the quality attributes of oil extracted from liquid-smoked samples were the nearest to that recorded for cold-smoked samples (the best) during storage and by the end of

storage either at 25 °C or 4 °C. Storage of smoked herring at 4 °C for 90 days may be better than storage at 25 °C for 30 days. For more safety and to consume smoked fish with high quality, storage of smoked herring should not exceed 20 days at room temperature and 60 days at cold storage under the conditions of this study.C- Fatty acids composition and fraction:It could be noticed that the predominant saturated fatty acids was the palmitic acid (C16-0) in raw frozen herring while,the predominant unsaturated fatty acids were oleic (C18:1), docosahexaenoic (C22:6), eicosapentaenoic (C20:5) and linoleic (C18:2) respectively. The total polyunsaturated fatty acids showed 34.01 % of total fatty acids for raw frozen herring. All smoking methods affect the essential fatty acids content, nevertheless, the liquid-smoked herring was the best followed by cold and hot-smoked herring. Immediately after smoking, lipid oxidation was occurred as the total saturated fatty acids were increased and the total unsaturated fatty acids (TUFAs) were decreased but, oxidation level was lower of liquid followed by cold-and hot-smoked fish. During storage either at 25 °C or 4 °C, the cold-smoked fish showed lower oxidation than liquid smoked one while hot-smoked fish indicated more oxidation at the same time nevertheless, oxidation levels were higher at 25 °C then 4 °C.D- Lipid fractions:By using thin layer chromatography, the results indicated that the raw frozen herring revealed eight fractions of lipids as follow: 1) phospholipids (PL), 2) monoglycerides (MG), 3) cholesterol (CL), 4) diglycerides (DG), 5) free fatty acids (FFA), 6) tocopherol (TO), 7) triglycerides (TG) and hydrocarbons (HC). Immediately after smoking process the percent of MG, HC, FFA, and CL fraction, were increased by using the different smoking methods either liquid, cold or hot smoking while at the same time, the TG was decreased. During storage of smoked herring, it could be noticed that the PL and TG decreased by increasing.