

Chemical hydrolysis of shark liver oil to produce fatty acid extracts for nutraceutical applications

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Fatty acids (FAs) play a substantial role in human health. Shark liver oil (SLO) is a rich source of FAs particularly of Omega-3 polyunsaturated fatty acids (PUFAs) including, Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA). This study is focused on the chemical hydrolysis of SLO to produce FAs extract and characterize for nutraceutical applications. SLO was extracted using conventional heat extraction method and followed by the purification of crude SLO (CSLO) was performed using a semi-refining which included, degumming, neutralization, and bleaching to produce purified SLO (PSLO). Hydrolyzed SLO (HSLO) was produced using chemical hydrolysis (KOH catalyst) of PSLO. The oleochemical indices (OIs): Free fatty acid (FFA), Acid value (AV), Peroxide value (PV), Saponification value (SV), Anisidine Value (p-AV) and 2-thiobarbituric acid value (TBA) were evaluated and fatty acid composition (FAC) was determined by GC-MS. OIs varied significantly ($p < 0.05$) between CSLO, PSLO and HSLO. The higher FFA (76.57%) and AV (152.32 mg KOH/g) in HSLO verified the efficiency of hydrolysis. PV and p-AV levels of CSLO, PSLO and HSLO were recorded as 7.67, 8.63, 9.95 mEq O₂/kg and 9.90, 24.57, 39.26 mEq/kg, respectively. The SV in CSLO, PSLO and HSLO were 242, 270, 219 (mg KOH/g), while TBA showed 81.70, 98.21, 122.41 nmol Malondialdehyde/g, respectively. The monounsaturated fatty acids (MUFAs), total omega-3, total omega-6 and EPA+DHA percentages in the CSLO, PSLO and HSLO, were not significantly

changed and remained around 17%, 28%, 11%, 25%, respectively. The saturated fatty acids (SFAs) decreased from 35.71% to 32.87% and PUFAs level increased from 41.68% to 44.57% in HSLO compared to CSLO. Thus, it can be concluded that the HSLO is an ideal source of PUFAs and MUFAs due to the significant preservation of FAC during the purification and hydrolysis process, enabling development of novel alternative nutraceutical applications.

Keywords:

Shark liver oil (SLO); Chemical hydrolysis; Purification; Oleochemical indices; Fatty acid composition (FAC)

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