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Determination of color characteristics, fatty acid composition and heavy metal in purified shark liver oil.

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Shark liver oil (SLO) is a promising source of fatty acids (FAs) particularly of Omega-3 polyunsaturated FAs including, Eicosapentaenoic acid (EPA- cis-5, 8, 11, 14, 17-eicosapentaenoic acid) and Docosahexaenoic acid (DHA- cis-4, 7, 10, 13, 16, 19-docosahexaenoic acid). SLO as a dietary supplement is one of the best options to overcome health-related problems that arise due to imbalance and insufficient levels of omega-3 FAs. The objectives of this research were to extract and purify omega-3 rich oils from shark livers by traditional method and determine color characteristics, fatty acid composition (FAC), and heavy metals (As, Cd, Pb, and Hg) during purification. SLO was extracted using the conventional heat extraction method. Purification of crude SLO (CSLO) was done using a semi-refining which included, degumming, neutralization, and bleaching to produce purified SLO (PSLO). The color of the SLO was determined using a Chromameter and FAC was determined by Gas Chromatography - Mass Spectrometry. The heavy metals in SLO were determined using Inductively Coupled Plasma-Mass Spectrophotometry after microwave digestion. Both chroma value and hue angle were enhanced during purification, ranging from 15.15 to 35.18 and from 25.17 to 87.68, after each step of purification respectively. Moreover, the total color difference was significantly increased ($p < 0.05$) in every step of purification, with values of 17.02, 30.78, and 39.17, respectively. During purification, the contents of saturated FAs and monounsaturated FAs significantly increased ($p < 0.05$) from 117.63 to 141.53 mg g^{-1} and from 78.91 to 117.53 mg g^{-1}, respectively w hile, polyunsaturated FAs levels significantly decreased ($p < 0.05$) from 141.95 mg g^{-1} in CSLO to 131.09 mg g^{-1} in PSLO, respectively. The omega-3 fatty acids significantly decreased ($p < 0.05$) from 96.35 to 83.83 mg g^{-1} and the EPA+DHA level significantly decreased ($p < 0.05$) from 85.58 to 72.35 mg g^{-1} in PSLO compared to CSLO. The As levels decreased during purification from 8.749, 0.348, and 0.006 mg kg^{-1}, respectively. As was not detected (ND) in PSLO. Cd was ND in any SLO. Pb was recorded only in CSLO with a level of 0.225 mg kg^{-1}. Hg levels of CSLO and PSLO were found to be 0.292 and 0.135 mg kg^{-1}, respectively. SLO purification enhanced color characteristics with lowering of heavy metal contents. Moreover, it can be concluded that the purified SLO is a promising rich source of omega-3, enabling the potential for the development of omega-3 dietary supplements.

Keywords: Color characteristics, Heavy metals, Omega-3, Purification, Shark liver oil

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