Biochemical studies on flax seeds

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Flax meal (Linum usitatissimum L.) was obtained from ShobraMelles Zefta, Egypt.The maximum flax meal protein extraction was achieved at pH 10 (88.9%) while, at pH 4 (iso-electric point reached the lowest amount). The cyanogenic glycosides were totally destroyed after 20 min autoclaving. Protein isolate has high protein content (90.1%), low ash (2.1% with free trypsin inhibitor activity and cyanogenic glycosides but, it contains little amounts of total phenolic compounds 23.2 mg/100 g and phytic acid (0.24%).Effect of different treatments on the removal of antinutritional factors.Autoclaving seems more effective on the removal destruction of total phenolic compounds compared with roasting and solvent treatments but, less effective on the destruction of phytic acid compared with roasting.Amino acids of flax meal protein isolate:Flax meal protein isolate has higher essential amino acid contents than proposed 36% for an ideal protein as reported by FAO/WHO (1973). Flax meal protein isolate is lower in sulpher containing amino acids i.e. systine and methionine but had higher quantities of leusine, phenyl alanine, valine and lysine. Also, protein isolate contains high level of glutamic, asparatic and argenine. Since lysine is the firstStutuncvu,limiting essential amino acid in most cereal protein, consequently addition of flax meal protein isolate to food would certainly be very fruitful on fortifying foods and may be considered as potential source of high quality plant protein.Effect of different treatments on protein digestibility index of flax meal and protein isolate:The digestibility index for flax meal (in vitro) was 61% while, after treatment with different organic solvents the digestibility index increased. Roasting, autoclaving and protein isolate had higher protein digestibility index than the other treatments (84.80, 85.20 and 89.19%, respectively). These increment could be due to the decrease of antinutritional factors of flax meal and protein isolate.Physical and chemical properties of flax seed oil:a) Crude lipid content was 28.27, the refractive index and specific gravity were 1.473 and 0.930. The acid, peroxide and saponification value were 1.47 mg/g, 2.135 and 193.41. Iodine value (g/100g) was 187, ester value was 191.94 and unsaponifiable matter was 0.97%.b), GLC analysis of the fatty acids identified the presence of five fatty acids between C16 and C18. Two saturated fatty acids and were identified as palmetic and stearic acids. While, the unsaturated were oleic, lenoleic and lenolenic acids. The saturated represented 8.34 and 7.92% with total amount of 16.26% while, the unsaturated were 33.77, 14.25 and 35.72% with total amount of 83.74%. Linolenic acid was the predominant fatty acid and had the highest amount of unsaturatedSustunaw 58fatty acids (35.72%) followed by oleic (33.77%) and lenoleic acid (14.25%). The ratio of saturated to unsaturated was 1 : 5. Therefore, flax seed oil can be classified as dry oil.c) The unsaponifiable matter was identified and determined by GLC analysis. The analysis showed that the unsaponifiable could be divided into two parts. The first part corresponded to saturated and unsaturated hydrocarbons. The second part comprised the sterol compounds. GLC analysis of the unsaponifiable matter show the presence of 27 peaks corresponding 27 fractions of hydrocarbons and sterols.Hydrocarbons:The hydrocarbons of flax unsaponifiable matter were fractionated by GLC into twenty different compounds. Ten were characterized while the other were unknown. The unknown may have one or more double bonds (or some other functional groups). The identifiedhydrocarbons were C12, C14, C15, C16, C17, C18, C19, C20, C21 and C22.Hydrocarbons content was 48.51%.Sterols:.Only five sterols were identified and two unknowns. Sterol content was 52.02%. 13-sitosterol and the unknown compound of RRT 1.05 had the highest ratios (15.15 and 16.81%), while squalene had the lowest amount (3.25%). p-sitosterol has inhibitory effect on cholesterol absorption. The ratio of total hydrocarbons to total

sterolswas 1.00 : 1.07.Summtati