# BIOCHEMICAL AND TECHNOLOGICAL EVALUATION OF FLAXSEED IN PRODUCTION OF SOME FUNCTIONAL FOODS

***By***

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# ABSTRACT

The present study was carried out to evaluate the physical, functional, chemical properties, phytochemical profiles as well as antioxidant and anticancer activities of different flaxseed flours i.e. full fat flaxseed flour (FFF), roasted full fat flaxseed flour (RFFF), defatted flaxseed flour (DFF) and roasted defatted flaxseed flour (RDFF). The characterization of flaxseed protein isolate (FPI) from defatted flaxseed was studied. The incorporation of FPI into pasta (at 2.5, 5 and 7% of wheat flour) was assessed relative to pasta control (100% wheat flour). Increasing the percentage of FPI up to 7.5% decreased the overall acceptability scores compared with other pasta samples. The quality and technological characteristics of the flaxseed crackers as partially flour substitution and flaxseed brownies as partially shortening substitution (10, 20 and 30% substitution level) were also evaluated. Results revealed that flaxseed flours especially RFFF and RDFF have a good nutritional and functional profiles. Roasting process was found to be an effective method for reducing anti-nutrients content such as (phytic acid, cyanogenic glycoside and trypsin inhibitors) and improved protein digestability. Results showed that RDFF had significantly the highest content of phytochemical profiles and antioxidant activity. Cytotoxicity effect of lignans ethanolic extracts from defatted and roasted defatted flaxseed on colon carcinoma cell line (HCT) and breast carcinoma cell line (MCF-7) increased as the extract concentration increased. The RDFF had strong anticancer activity toward two tested cell lines (MCF-7 and HCT) with $IC_{50}$ value (29.0 and 31.4 µg/ml, respectively). Substitution with RDFF increased significantly the content of protein, fat, ash

and fiber contents of the crackers relative to control. The microbial load obtained of produced flaxseed were under the acceptable limits for a period of 3 months from the date of manufacture. Total phenolic content (TPC) and antioxidant activity (AOA) of flaxseed crackers tended to increase significantly with increasing the addition level of flaxseed and decreased with increasing storage period at ambient temperature (25±5°C) when compared to control sample. Overall acceptability of fat-replaced brownies samples was decreased by increasing level substitution with RFFF relative to control. Results indicated that linolenic acid percentage (omega-3) was increased via increasing flaxseed level of brownies samples. The obtained microbial load of produced brownies was in acceptable value range without any adverse effect on the qualities of the brownies for a storage period up to 3 weeks at room temperature (25±5°C). Concerning fat quality parameters, it could be noticed that peroxide value increased gradually up to the end of the storage period in all brownies samples. In addition, mean score values for thiobarbituric acid (TBA) showed gradually increased in values for both control and flaxseed brownies samples with increasing storage period up to 3 weeks. TBA values increased with shortening substitution level was increased and the increase was considerably higher in brownies prepared with 30 % RFFF of shortening substitution.

**Key words:** Flaxseed, defatted and roasted flaxseed flour, bioactive compounds, antioxidant activity, anticancer activity, flaxseed protein isolate, crackers, brownies.