Determination, characterization and comparison of chemical and morphological changes in ultrasonically extracted chitin from the shells of fresh water prawns (*M. rosenbergi*) and North Atlantic shrimp (*P. borealis*).

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Justification: Extraction and purification of chitin, an important industrial food biopolymer, from crustacean sources is an expensive, time consuming and vigorous process. Applying ultrasound during extraction may improve efficiency of extraction, purity and functional properties of chitin.

Objectives: The objective of this study was to determine the effect of sonication during chitin extraction on yield, purity, and crystallinity of chitin. Crustacean waste, (P. borealis) was obtained from Primex, Iceland.

Methods: Waste was washed, lyophilized and grounded to an average particle size of 60µm, suspended for 4h in 0.25M HCl (1:40) at 40º C while ultrasonicating at 41 W/cm2 for 0h, 1h and 3.5h. Shells were lyophilized and treated with 0.25 NaOH (1:15) for 4h sonication at 41 W/cm2 for 0h, 1h and 3.5h to remove proteins. Yield, and mineral- and protein content were determined after each process step. Purity of extracted chitin was assessed as total amount of glucosamine in samples. Crystallinity Index was determined using wide angle X-ray scattering. Apparent average crystallite size was calculated using the full width of half the maximum.

Results: Analysis of scanning electron microscope images confirmed morphological changes in samples. Yield of chitin from crustaceans decreased from 17.02±0.66% to 11.09±1.46% of initial mass with extensive sonication which was attributed to increased concentrations of depolymerized materials in the wash water. Removal of minerals was not affected by sonication. Application of ultrasound enhanced removal of proteins from 0.58±0.08% to 0.32±0.03% dry weight. Glucosamine content decreased with sonication from 66.70±2.81% to 59.12±2.97%. The crystallinity index of chitin decreased with prolonged exposure to ultrasound, from 81.6% to 79.1% and 78.5%, after 1h and 3.5h respectively. Results were attributed to morphological and chemical changes in raw material after prolonged sonication.

Significance: Overall, ultrasound may reduce processing time and concentration of required solvents but result in partial loss of material in the wash due to depolymerization.