In-silico study of allergenic proteins of certain food legumes: peanut, lentil, sesame and cowpea

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Abstract – Peanuts, lentils, sesame and cowpeas are protein-rich legumes widely consumed in the human diet. However, some so-called allergenic proteins are capable of causing adverse reactions in genetically predisposed individuals. They contain portions consisting of contiguous linear segments of amino acids involved in binding with specific IgE. They also have three-dimensional conformational patterns that cross-link with antibodies from susceptible individuals.

In this work, the identity and similarity between certain allergenic proteins of peanut, lentil, sesame and cowpea are studied by global alignment. The latter is carried out on 21 allergenic proteins (7 from peanuts, 3 from lentils, 3 from sesame and 8 from cowpea) using the EMBOSS Needle software which uses the Needleman-Wunsch algorithm and assigns scores to the pairs of amino acids aligned using a specific BLOSUM substitution matrix. For statistical analysis, the dependency test and the chi-square test are used in GraphPad Prism and R-studio.

The results show that the overall alignment between allergenic proteins from the same food (**Peanut - Peanut**, **Sesame - Sesame**, and **Lentil - Lentil**) and different foods (**Peanut - Lentil**, **Peanut - Sesame**, **Lentil - Sesame**, **Lentil - Cowpea**, and **Sesame - Cowpea**) has low identity and similarity.

The overall alignment between the allergenic proteins of the same food (**Cowpea - Cowpea**) and of different foods (**Peanut - Cowpea**) shows a strong identity and similarity, relative to the result of the chi-square test ($P<0.0001$)

The possibility of cross-reactivity between cowpea and peanut is shown.

Keywords – Food Legumes, Allergenic Proteins, Global Alignment, Identity, Similarity.