IN-SILICO EVALUATION OF BIOACTIVITY OF PHYCOCYANIN FROM RED ALGAE

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Session: 2019-20

A thesis submitted in the partial fulfillment of the requirements for the degree of Master of Science in Applied Human Nutrition and Dietetics

Department of Applied Food science & Nutrition

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Chattogram Veterinary and Animal Sciences University,

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August, 2022

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August, 2022

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Professor

Department of pathology and parasitology

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DEDICATED

to

MY BELOVED PARENTS

ACKNOWLEDGEMENTS

All credit goes to Almighty Allah for blessing me with the strength, persistence to pursue higher education and complete the thesis for the degree of Masters of Science (MS) in Applied Human Nutrition and Dietetics under the Department of Applied Food Science and technology, at Chattogram Veterinary and Animal Sciences University, Bangladesh.

I pay gratitude to Professor **Dr. Goutam Buddha Das**, Vice-Chancellor, Chattogram Veterinary and Animal Sciences University (CVASU) for giving special opportunities and providing such research facilities.

I would like to convey my heartfelt gratitude and indebtedness to my supervisor **Professor Dr. Md. Abdul Alim**, Department of Pathology and Parasitology in Faculty of Veterinary Medicine, at Chattogram Veterinary and Animal Sciences University, Bangladesh, for his advice and suggestions. His unwavering support, insightful recommendations, constructive criticism, guidance encouraged me to persevere throughout this study and thesis preparation.

Also I am very much grateful to **Kazi Nazira Sharmin**, Head and Associate professor, Department of Applied Food Science and Nutrition, Chattogram Veterinary and Animal Sciences University, Bangladesh, for her befitting enthusiasment, charitable guidance in carrying out the research work.

I would like to express cordial thanks to my loving friends and well-wishers for their cooperation, cheerfulness and inspiration during the course of this study. I also express my heartfelt respects and thanks to my beloved parents and brothers for their understanding, inspirations, support, kindness blessings, and endless love to complete this study.

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LIST OF ABBREVIATION

ACE	Angiotensin-converting enzyme
DPE IV	Dipeptidyl peptidase IV
E/S	Enzyme to substrate ratio
EU	Experimental unit
HCL	Hydrochloric acid
KCL	Potassium chloride
EDTA	Ethylene di-amine tetra acetic acid
Ala	Alanine
Arg	Arginine
Asn	Asparagine
Asp	Aspartic acid
Asx	Asparagine or aspartic acid
Cys	Cysteine
Glu	Glutamic acid
Gln	Glutamine
Gly	Glycine
His	Histidine
He	Isoleucine
Leu	Leucine
Lys	Lysine
Met	Methionine
Phe	Phenylalanine
Pro	Proline
Ser	Serine
Thr	Threonine
Trp	Tryptophan

Tyr	Tyrosine
Tyr	Tryptophan
Val	Valine
kda	Kilodalton
%	percentage
&	And
Et al	Et alii/et aliae/et alia

ABSTRACT

Phycocyanin (PC) is a neutraceutical compound with biological action which is extracted and purified from seaweeds. It is found in red algae, blue-green algae and different seaweeds. According to the Algae Base dynamic species count, there are roughly 10,000 species of seaweeds, the vast majority of which are red algae. The percentage of protein in dried red seaweed varies between 20 and 47 percent (dw), so it's proteins are potential precursors for showing bioactivity. In this present study, seventeen proteins of red algae (*Pyropia endiviifolia, Pyropia pulchra, Neopyropia yezoensis, Neoporphyra haitanensis, Pyropia fucicola, Pyropia kanakaensis, Neoporphyra dentata, Neoporphyra dentata, Galdieria sulphuraria, Polysiphonia urceolata*) have been selected as potential precursors of bioactivity based on *in silico* approach. In silico analysis of Phycocyanin performed high numbers of peptides angiotensin-I-converting enzyme (ACE-I), dipeptidyl peptidase-IV (DPP-IV) and Alpha glucose inhibitor. Chymotrypsin, papain, thermolysin and stem bromelain have been used in-silico proteolysis. For that reason, 45 different tripeptides and dipeptides are tested to see whether any of them can be considered novel bioactive peptides. The distinctive features of the peptides have been explored using Peptide Ranker, PepCalc, Peptide Cutter, ToxinPred, AllerTop, and AHTpin. Bioinformatics analysis indicates that the vast majority of the peptides are likely to be non-toxic, very promising, and safe for use. Future *in-vitro* and *in-vivo* studies of the bioactivity of phycocyanin from red algae can be based on these results. This research emphasizes the promise of phycocyanin from red algae as a base material for the creation of novel meals and medicines.

Keywords: Red algae, Phycocyanin, Bioactive peptide, In silico, ACE inhibitor, DPP IV inhibitor, Alpha Glucose inhibitor.