Evaluation and comparison the bioactive properties of peptide fractions from Enzymatic hydrolysis of isolated protein microalgae of *Spirolina platensis* and *Chlorella vulgaris*

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Methods:

1-Preparation and cultivation of microalgal species

2- Production of bioactive peptides

3-Determination of functional properties

4-Identification of protein molecular weight using electrophoresis

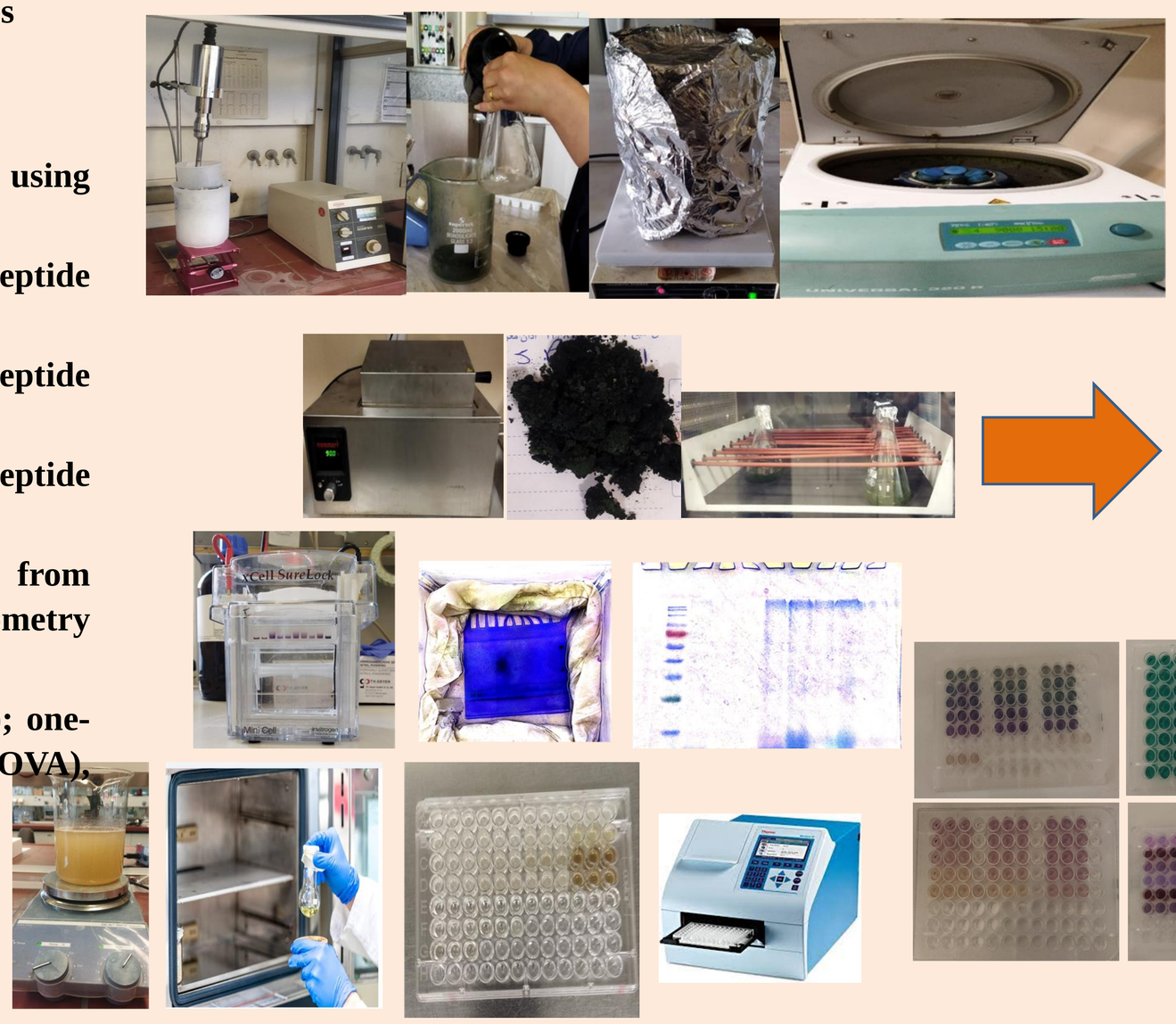
5-Evaluation of the antioxidant properties of peptide fractions derived from microalgae

6-Assessment of the anti-aging activities of peptide fractions derived from microalgae

7-Evaluation of the antibacterial activity of peptide fractions derived from microalgae

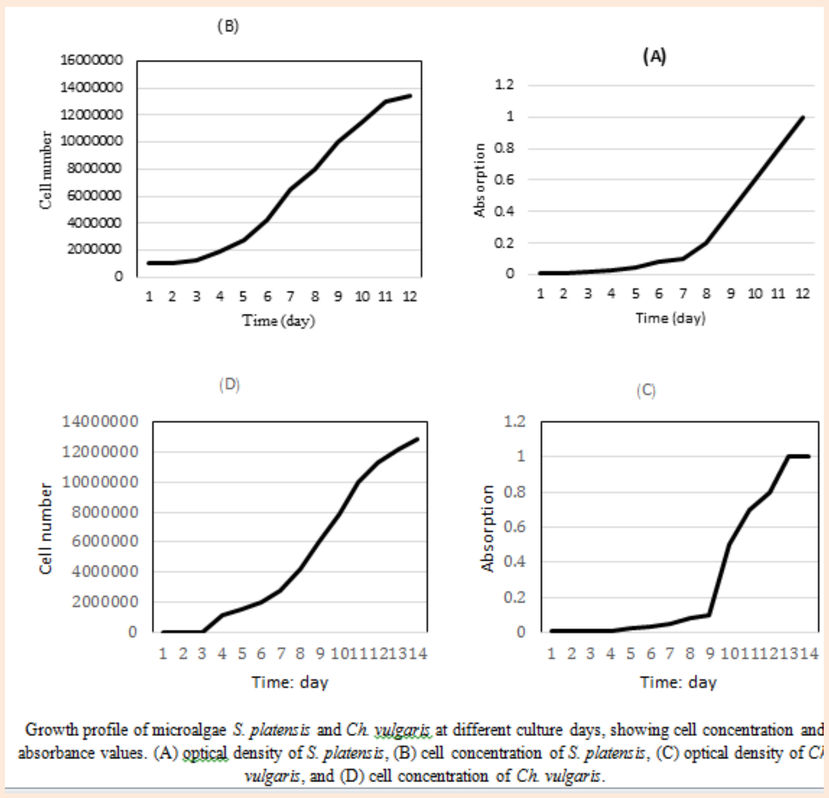
8-Investigation of compounds extracted from microalgae using high-resolution mass spectrometry and molecular networking

9-Statistical analysis: SPSS software (version 20); one-way and two-way analysis of variance (ANOVA), Duncan's multiple range test for mean comparison,
and the t-test at a significance level of 5%



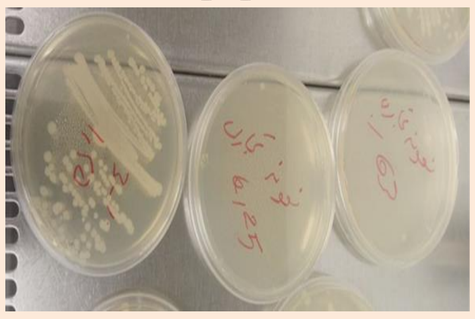
Results and Achievements:

Cultivation of microalgae

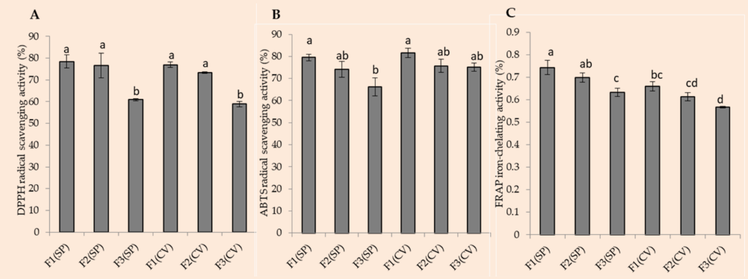


Growth profile of microalgae *S. platensis* and *Ch. vulgaris* at different culture days, showing cell concentration and absorbance values. (A) optical density of *S. platensis*, (B) cell concentration of *S. platensis*, (C) optical density of *Ch. vulgaris*, and (D) cell concentration of *Ch. vulgaris*.

Antibacterial activity of microalgal peptides



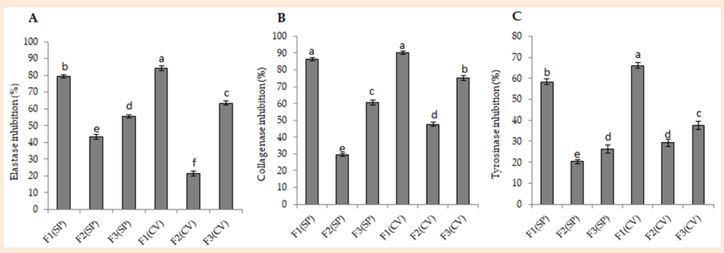
Antioxidant activity of microalgal peptides



Identified di- and tripeptides in microalgal peptides

Compound name	Parent mass	RTMean	Shared peaks	MassDiff	MZErrorPPM	G2	G3	Sum(precursor intensity)
Arg	175.111	245	7	0	46	11	9	1063650
Gly-Tyr	239.128	423	6	0	106	0	2	219658
Tyr	182.075	418	6	0	33	1	1	20414.9
Arg-Phe	322.177	418	13	0	31	3	5	3034840
Gly-Met	207.073	393	7	0	34	1	1	110070
His-Ile	269.152	223	8	0	45	8	8	6476530
Ile-Arg	288.195	272	11	0	28	19	23	2.80E+07
Ile-Glu	261.136	415	7	0	46	6	2	5890900
Ile-Ile-Lys	373.268	458	8	0	35	2	3	907111
Ile-Leu	245.178	489	7	0	33	4	5	6523160
Leu-Gly-Leu	302.197	493	6	0	43	2	3	263980
Leu-Phe	279.162	513	6	0	29	4	3	6710350
Leu-Trp	318.17	520	7	0	35	2	4	1666900
L-Tryptophan	188.064	495	6	0	43	1	0	60081.8
Lys-Leu	260.189	225	7	0	31	9	11	8957020
Lys-Val	246.173	111	7	0	32	2	2	940538
Met-Val	249.118	444	6	0	36	2	1	167997
Phe-Gln	294.172	403	9	0	95	2	5	1471660
Ser-Leu	219.127	440	9	0	32	2	1	315250
Ser-Phe	253.143	471	7	0	99	0	1	12518.7
Trp-Phe	352.154	539	6	0	34	0	2	38449.2
Tyr-Ile	295.155	479	7	0	31	2	2	1937350
Tyr-Phe	329.138	490	6	0	39	2	5	718040
Val-Arg	274.179	110	11	0	29	1	3	3451130
Val-Ile	231.163	458	7	0	35	4	4	5559840
Val-Trp	304.155	503	7	0	33	1	1	51678.6

Anti-aging activity of microalgal peptides



Functional properties of microalgae

	Spirulina protein isolate	*Spirulina* protein hydrolyzed	*Chlorella* protein isolate	*Chlorella* protein hydrolyzed
Water absorption capacity (g water/g protein)	1.45 ± 0.97^{b}	3.19 ± 0.13^{a}	0.88 ± 0.05^{b}	2.87 ± 0.18^{a}
Oil absorption capacity (g oil/g protein)	1.05 ± 0.61^{b}	1.05 ± 0.61^{b}	1.03 ± 0.52^{b}	3.88 ± 0.97^{a}
Emulsion stability (min)	121 ± 0.63^{b}	143 ± 0.76^{a}	112 ± 0.21^{b}	124 ± 0.09^{a}

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Conclusion: *Spirulina platensis* and *Chlorella vulgaris* are valuable sources for the production of bioactive peptides with antioxidant and anti-aging properties, and they can be utilized in the development of novel pharmaceutical, food, and cosmetic products.