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<b>Abstract</b>	:	<p><i>Chlorella vulgaris</i> (<i>C. vulgaris</i>) has a high protein content, making it one of the most promising protein sources. Subcritical water treatment is an approach for protein extraction since it takes less time, uses less solvent, and can be scaled up. Therefore, the purpose of this work was to investigate the influence of significant process parameters such as temperature, reaction time, and pH on the extraction of protein from <i>C. vulgaris</i>. <i>C. vulgaris</i> is also being studied for its ability to produce angiotensin I-converting enzyme (ACE) inhibitory peptides. Subcritical water hydrolysis at various times (5–20 minutes), temperatures (200–300°C), and alkaline media (pH 9.6 and pH 11) enhanced protein solubility with high total protein content (113.96–596.86 mg/mL) and degree of hydrolysis (6.02–30.56%). Thermal degradation of the products was observed when the hydrolysis was carried out at a higher temperature for a longer time. The addition of an alkaline medium enhanced the degree of hydrolysis substantially, demonstrating the importance of pH during hydrolysis. Furthermore, the hydrolysates produced had high ACE-inhibitory activities of 95.23% (pH 9.6, 250°C, and 5 minutes) and 90.52% (pH 11.0, 200°C, and 5 minutes).</p>