

Preliminary Assessment of Herbal Remedies in Inhibiting Citrullination of Arginine: An Implication in Mitigating Rheumatoid Arthritis

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ABSTRACT

Porphyromonas gingivalis is a leading pathogen in chronic periodontitis, a disease process involving progressive destruction of the tissues that support the teeth. The microorganism has been recently reported to produce a unique bacterial enzyme, *P. gingivalis* peptidyl-arginine deiminase (PPAD), which has the ability to convert arginine residues in proteins to citrulline. Protein citrullination alters protein structure and function. Hence, PPAD may be involved in deregulation of the host's signalling network and immune evasion. Further, accumulating evidence suggests a role for autoimmunity against citrullinated proteins in the development of rheumatoid arthritis (RA). However, no effective treatment for RA has been reported till date as the drugs in the market are only capable of merely treating the symptom and not the actual cause of it. Hence, the usage of herbal remedies has become increasingly popular as an alternative treatment for mitigating the disease progression of RA. In this study, we have successfully produced the PPAD enzyme using methods of recombinant technology like PCR, cell transformation, cloning and protein expression and used it to screen for potential citrulline inhibitors. Citrulline colorimetric assay was performed to determine the percentage activity of PPAD enzyme in the presence of herbal extracts (%) and the amount of citrulline produced (μM). A total of 21 different herbs were used and the results indicated *Pinellia ternate* and *Bupleurum chinensis* are herbs that possessed extraordinary inhibitory activities. The activity of PPAD enzyme in the presence of medicinal plants was calculated to be at a percentage of 15.23% and 17.77% respectively. The amount of citrulline produced for *Pinellia ternate* is 10.344 μM and 12.069 μM for *Bupleurum chinensis* which is found to be the most effective herbs in inhibiting the activities of PPAD enzyme and reducing the amount of citrulline produced. Further investigations should be carried out to understand the mechanism of how the herbal extracts were able to inhibit the activity of PPAD and to isolate the bioactive compounds from the herbs which might be useful in mitigating the disease progression of RA.