Partial Characterization and Evaluation of Antibacterial Potential of an L-amino Acid Oxidase Obtained from Bothrops jararacussu venom

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Introduction: Healthcare-associated infections are causes of mortality and morbidity worldwide. The prevalence of bacterial resistance to common antibiotics has increased in recent years, highlighting the need to develop novel alternatives for controlling these pathogens. Snake venoms are rich sources of proteins, enzymes and peptides. L-amino acid oxidase (LAAO) is a multifunctional enzyme that is able to develop different activities including induction of cell apoptosis or necrosis, enhancement or inhibition of platelet aggregation, stimulation of edema formation, antimicrobial and antitumor activities. In this study, we isolated and partially characterized a LAAO from Bothrops jararacussu venom and evaluated its antibacterial potential.

Material and Methods: The LAAO isolation involved three purification steps: an affinity chromatography on Con A-Sepharose column and two steps of ion exchange chromatography on MonoQ column, being the protein homogeneity evaluated by SDS-PAGE. Assessment of LAAO activity was conducted in 96 well microplates, with enzyme and substrate solution containing L-amino acid, peroxidase and \textit{o}-fenilenediamina. The minimal inhibitory concentration was determined using a standardized dilution method according to Clinical and Laboratory Standards Institute (CLSI).

Results and Discussion: The purification of LAAO was successfully carried out by three chromatographic steps. The homogeneity of LAAO after purification was confirmed by the presence of a single band in SDS-PAGE. Purified LAAO showed a molecular weight around 68,000. The isolated LAAO displayed higher affinity to L-Phe, followed by L-Met and L-Arg. The LAAO revealed antibacterial activity against Gram-negative – \textit{Proteus vulgaris} and \textit{Citrobacter freundii} – and Gram-positive – \textit{Listeria monocytogenes}, \textit{Bacillus cereus}, \textit{Bacillus subtilis} and \textit{Staphylococcus aureus}.

Conclusion: These results suggested that this is a multifunctional enzyme with therapeutic potential. The development of further studies involving this theme is necessary in order to enlarge enzyme characterization and evaluate other potential bioactive actions for better understanding this interesting enzyme class.

Keywords: L-amino acid oxidase, antimicrobial, \textit{Bothrops jararacussu}

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