COMBINED VENOMICS, VENOM GLAND TRANSCRIPTOMICS, BIOACTIVITIES, AND ANTIVENOMICS OF TWO BOTHROPS JARARACA POPULATIONS FROM GEOGRAPHIC ISOLATED REGIONS

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INTRODUCTION AND OBJECTIVES: Bothrops jararaca is the main medical relevant venomous snake species in Brazil. Although no subspecies are currently recognized, phylogenetic analyses have revealed the existence of two well-supported B. jararaca clades that currently display a southeastern (SE) and a southern (S) distribution. Our main goal was to analyze the venom the two populations of B. jararaca, access biological activities, investigate the immunoreactivity of commercial antivenoms and verify if ontogenetic regulation underlie geographic venom variation.

MATERIALS AND METHODS: A venomic approach (reverse-phase HPLC, electrophoresis, in-gel digestion, mass spectrometry) combined with 454 transcriptomic analysis was applied for venom characterization followed by in vitro immunoaffinity protocol (antivenomics) and in vivo neutralization of lethal activity by antivenoms. A set of biological activities were also conducted. RESULTS AND CONCLUSIONS: Comparisons of the venom proteomes and transcriptomes of B. jararaca from the SE and S regions revealed notable interpopulational variability including, in the case of the S population, a marked ontogenetic venom compositional change involving the upregulation of the myotoxic phospholipase A2 (PLA2) homolog, bothropstoxin-I. Otherwise, the SE population D49-PLA2 molecules, BinTX-I and BinTX-II, suggests that the mainland ancestor of B. insularis was originated within the SE B. jararaca phylogroup and that B. insularis expresses a paedomorphic venom phenotype. The two geographic B. jararaca venom pools showed some distinct bioactivity profiles. However, the SAB (soro antivotópico) antivenom manufactured in Vital Brazil Institute neutralized the lethal effect of both venoms to a similar extent. In addition, immobilized SAB antivenom immunocaptured most of the venom components of the venoms of both B. jararaca populations, but did not show immunoreactivity against vasoactive peptides. The reported differences in venomics data gathered from populations confirmed to well-differentiated clades of the same B. jararaca species and immunization protocols are efficient and cover the differences among population, possibly because the use of five species in the pool of immunization.

Keywords: proteomics; geographic variation; venom.

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