ORAL PRESENTATIONS

[ID-O#076] Fibrinogen Quantification on a Chip Using Microfluidic Technique in Patients with Suspected Green Pit Viper Bite

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Introduction: Fibrinogen measurement is usually done in central laboratories and is not always possible in hospitals in developing countries where viper envenomation most often occurs. Several bedside tests for hypofibrinogenemia have been used instead with various sensitivities and specificities.

Objectives: Our aim was to develop a microfluidic chip to measure the fibrinogen level (FL) in green pit viper (GPV) bite patients. We also aimed to determine the association between the FL measured using this technique and that from the hospital central laboratory.

Method: In collaboration with the Synchrotron Light Research Institute (SLRI), we developed a microfluidic chip that was used to quantify FL in the later phases of envenomation. Our first step (Phase 0) was to construct curves between the resistances obtained to clot formation from different dilutions of standard plasma (with a known FL) after thrombin was added. In Phase 1, we prospectively enrolled adult patients with a history of suspected/confirmed GPV bites visiting the Emergency Department (ED) of Vajira Hospital October 2022 to December 2023. Patient plasma samples obtained after centrifugation were diluted with buffer, then thrombin was added (Clauss method). Resistances generated to clot formation were measured and converted to FL using the reference curve from Phase 0. These FL were compared with those sent to the central laboratory department.

Results: In phase 0, the R2 value was 0.962 for the correlation between resistances and FL in standard plasma. The equation to calculate FL (y) from resistance (x) is y = -1985.3+7.19x. However, FL below 128 mg/dL were unreliable. In phase 1, 40 plasma samples from GPV bite patients were included. FL in the central laboratory ranged from 48.7 to 394.4 mg/ dL (normal: 200-400). The concordance correlation coefficient between FL measured from the chip and the central laboratory was 0.876 (0.815-0.936), and the R2 was 0.86. The equation to calculate FL from the chip (x) to the central laboratory levels (y) is y = -69.45+1.22x.

Conclusions: Correlation between the FL from the developed microfluidic chip and the central laboratory was excellent, especially when the FL was above 128 mg/dL. Since this test can be easily done at the bedside, it would be of benefit for the care of patients with viper envenomation who had hypofibrinogenemia. A larger subject population is needed for validation of these results.