URGENT NEED TO IMPROVE ANTIVENOM FOR TREATMENT OF SNAKEBITE IN INDIA

Introduction

Close to 50,000 people die of snakebite each year in India. While education and awareness programs are needed to **prevent** snakebite, the will of the Government and the interest of the antivenom producers are needed to successfully **treat** snakebite.

In 1895 the first antivenom for snakebite (called an anti-ophidic serum) was developed by Albert Calmette, a French scientist of the Pasteur Institute working at its Indochine branch, against the Indian Cobra (Naja naja). It is way past time to bring antivenom production, preclinical and clinical evaluation and deployment into the 21st Century. **The reality is that India needs simple, safe, and affordable antivenom of adequate potency that actually works against the target snake species across India's broad geographical area.**

The potency requirements for current antivenoms as set out in the Indian Pharmacopeia are woefully substandard given the species concerned and the potential injected venom doses that need to be neutralised. In the 1950's Indian antivenoms were required to be empirically up to 10 times more potent than today (on a mg venom neutralised per ml basis), and sadly, for reasons unknown, that standard was relaxed, leading to the current unsatisfactory situation.

Action to be taken

With adequate interest and effort (with a view to save thousands of lives), the process of developing a new, alternative antivenom can be put into action quite simply:

1. Firstly, India requires a robust, geographically well-sampled, pool of venoms for the 6 or more species that need to be included in the immunising mixture. One option is that representative specimens from as widely across each snake's range as possible need to be collected and all kept under one roof as well-maintained, well-fed and well-housed long-term captives. Another option can be a mobile venom collection unit covering the relevant areas in the country and the snakes released after extraction. Venom should be extracted every 14-21 days using MODERN techniques and the venom MUST be processed and stored all according to the WHO laboratory protocol for venom and antivenom production. Please refer to:
http://www.who.int/bloodproducts/snake_antivenoms/snakeantivenomguideline.pdf

2. The venom pools need to be characterised and properly assessed for lethality using the WHO APPROVED LD50 MOUSE ASSAY (Ibid). It is vital that we stop wasting time debating unproven alternatives and employ the techniques that the WHO has approved for use.

3. All the other WHO APPROVED venom characterisation tests need to be done for each venom pool and once the results are in, a standard must be adopted for what each new batch of venom must meet before it is used for antivenom production.

4. To effectively deal with what is the world's largest mortality from snakebite we must forget all the experimental and unproven alternatives for antivenoms (for example chicken IgY) that are still in R&D, and go with what is proven, safe, effective and cost-efficient - **equine whole IgG antivenom, processed with caprylic acid precipitation (CAP)**. It is important to take the expert advice of the

scientists at the Clodomiro Picado Institute in San Jose, Costa Rica, who have perfected the new range of high titre equine whole IgG antivenoms via CAP.

5. Establish quality control (QC) and ensure that the antivenom producers perform preclinical assessment on antivenoms in accordance with the WHO APPROVED GUIDELINES and methods therein.

6. Conduct well-designed Phase I and Phase II clinical trials with the help of experienced clinicians.

7. Publish all the resultant data in an open and transparent scientific process.

Footnote: In Papua New Guinea, the new antivenom - **equine whole IgG CAP Papuan taipan antivenom -** has a potency of 5.9 mg/ml in a 40 ml volume as a single dose infusion and has performed very well. A single vial of this product can potentially neutralise 236 mg of Papuan taipan venom (one of the world's deadliest snakes) which is more than twice the average venom yield produced by milking the snake! ***None of our Indian antivenoms even approach this strength and efficacy in treating lethal bites.***

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