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Cover Story : 136th Anniversary International Medical Congress



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SLMA President

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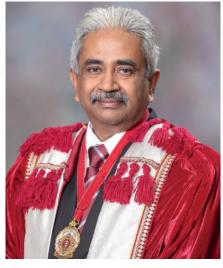
President's Message

Dear SLMA Members,

The Sri Lanka Medical Association (SLMA) held its 136th Anniversary International Medical Congress from the 25th to the 29th of July 2023 under the theme 'Humane Healthcare: Excellence, Equity, Community'. This annual flagship event of the SLMA calendar brings together medical professionals, academics, researchers, students, health activists as well as the general public. We held the Congress at a time when the country was facing an unprecedented crisis in the health sector. The session content and the structure were carefully selected to reflect the priority areas in the 3 subthemes namely, excellence, equity and community, and the time was divided in a novel way giving equal importance to each sub-theme. Subject experts in the respective fields were well represented in the plethora of sessions which took the form of Orations, Plenaries, Symposia, Panel Discussions, Paper Presentations and a Debate. The Congress concluded with the colourful and exciting 'Doctors' Concert'.

When we reflect on the outcome of the Congress, as is generally the case in the aftermath of an academic conference, new information, research findings etc. that are of significance to improve healthcare at all levels, have been presented and keenly discussed. The evidence and knowledge base were most definitely expanded on a paradigm shift towards excellence.

However, going beyond all that, what was also important was the fact that, while we recognize the extent and the complexity of issues affecting the health sector at present, we can perhaps also be somewhat optimistic about the future. Many presentations included solutions to problems that we are facing in the health sector. There are important, prudent, and exciting remedies as well as solutions that are already being implemented by the medical fraternity. While we observe an alarming trend of outmigration of medical personnel, it was extremely encouraging to note the commitment and dedication of our colleagues in the medical profession who have opted to stay on in Sri Lanka, tirelessly working



on solutions under severe resource constraints. These remedies that are being successfully implemented need to be mainstreamed and translated into policies. In the coming months, SLMA will distil the key learnings from the Congress and undertake advocacy on selected priority areas, both amongst the policymakers and the public.

While we can be hopeful and optimistic based on the efforts that are being carried out at the level of medical professionals in their own settings, we cannot ignore the fact that we need to address the systemic issues that are affecting our health sector. Despite assurances made by the authorities concerned to address the issues connected with quality and shortages of medicinal drugs, for example, not much real progress has been made. A key vacancy on the Board of National Medicines Regulatory Authority (NMRA), namely a Professor of Pharmacology, has only just been filled, mainly in response to the strong demands made by the SLMA. The question of public trust in the safety and efficacy of medicines and vaccines remains unaddressed. During the last month, the SLMA continued to engage with the relevant State authorities as well as the political leadership to find sustainable solutions to the crisis. We have also engaged the public through print and electronic media, by providing an independent and objective analysis of the current situation and creating awareness of the role the citizen can play in addressing the crisis.

When one analyses the overall situation, it is obvious that we need to focus on 'Health Governance' to find lasting solutions to the crisis we are facing in the health sector. Health governance plays a crucial role in maintaining people's health by providing a framework for effective planning, implementation, regulation, monitoring of health-related policies, programmes, and services. It involves the coordination and collaboration of various stakeholders, including the government, healthcare providers, communities, and citizens.

I wish to recall the reference I made in my President's Message in the April 2023 Issue of the SLMA Newsletter, to the speech by Justice Yasantha Kodagoda PC, Judge of the Supreme Court of Sri Lanka, as the Chief Guest, at the Induction Ceremony of the President of the Sri Lanka College of Medical Administrators (SLCMA). Justice Kodagoda made a strong appeal to the medical administrators to take up the issue of corruption and wastage in the health sector as a priority area requiring their attention. Sadly, we do not see much progress made in addressing these issues. This week, the outgoing Director General of the Inland Revenue Department (IRD) is reported to have said 'If you don't kill corruption, it will kill Sri Lanka'.

In essence, health governance is a cornerstone of public health. It establishes the foundation for a wellfunctioning healthcare system that can effectively address current health issues while preparing for future challenges. By fostering collaboration, accountability, and equitable access to care, health governance contributes significantly improving maintaining and people's health. SLMA will continue to vigorously advocate for effective health governance to ensure the health and well-being of our people. As a national enterprise, it is really the least that we could do towards getting our services to humanity out of this abysmal quagmire of despair.

Dr Vinya Ariyaratne President SLMA.

Activities in Brief

(16th July 2023 - 15th August 2023)

SLMA Saturday Talks

29th July

'Understanding Panic Disorder' by Dr Nisansala Liyanage, Lecturer, Department of Psychiatry, Wayamba University, Sri Lanka.



12th August

'Breast Cancer: Points to ponder via case based discussion' by Dr Nalinda Munasinghe, Senior Lecturer in Surgery, University of Kelaniya.



Other Activities

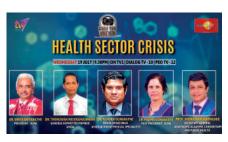
18th July

SLMA-Expert Committee on Road Traffic Crashes signed a MOU with Sri Lanka Insurance (SLIC). A very in-depth and fruitful discussion on collaboration between different stakeholders including Sri Lanka Police, Sri Lanka Red cross, Department of Motor Traffic, and Sri Lanka Transport Board, all of whom were present at SLMA followed The signing.



19th July

Dr Vinya Ariyaratne, President, SLMA, Dr Padma Gunaratne, Past Presidet, SLMA (2021) and Professor Indika Karunaratne, Past President, SLMA (2020) were panelists at Face Nation, TV1 on 'Health sector Crises'.



20th July

Dr Vinya Ariyaratne, President, SLMA was a panelist in Balaya programme in Hiru TV channel on 'How to solve the Sri Lanka Heath Crises'.



15th July

A clinical meeting was held with the collaboration of Ceylon College of Critical Care Specialists.

Dr Anthony Mendis on 'Tetanus: Not common in neurocritical care', Dr Sankalpa Vithanage on 'Cure sometimes, treat often and comfort always' and Dr Sunali Nanayakkara on conducted a 'Critical care quiz'.

All three resource persons were Consultant Intensivists attached to NHSL, Colombo



The 136th Anniversary International Medical Congress of the SLMA

'Humane Healthcare: Excellence, Equity and Community'

Dr Achala Balasuriya

Vice President SLMA

Co-Chairperson, Scientific Committee of the Congress

Sri Lanka Medical Association (SLMA) celebrated its 136th year of existence with an Anniversary International Medical Congress showcased at the Bandaranaike Memorial International Conference Hall (BMICH) in Colombo from 25th to 28th July 2023.

The event, held under the theme "Humane Healthcare: Excellence, Equity, Community" brought together a diverse congregation of medical professionals, researchers, and experts from around the world. The congress, spanning over two and half days was a captivating journey into the future of healthcare, underscored by its emphasis on compassionate healthcare, achieving excellence in the realms of both curative and preventive sectors, together with the compelling need for equity in today's context in providing quality healthcare services with community engagement.



Pre-Congress Sessions: Setting the Stage

The buildup to the congress was characterized by a series of six Pre-Congress Sessions that delved into various specialized areas of medicine. These sessions served as a captivating prelude in setting the stage for the broader discussions and insights that would unfold during the main event. Topics ranged from All about Research, Postgraduate Medical Education in Sri Lanka, Interventional Research, Sleep and Health, Integrating

Genetics and Genomics into clinical practice and to Sexual Health (Discard myths and Enjoy Sex). They were held at the SLMA auditorium over the last two months.





Inauguration Ceremony

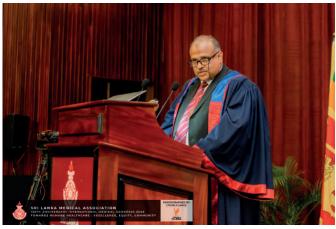
The Inauguration Ceremony was held on the 25th of July and was well attended by members of SLMA as well as non-members belonging to different medical fields. The Inauguration Ceremony was graced by esteemed personalities, marking the beginning of the vibrant congress. The presence of Chief Guest Professor Mohan De Silva, a distinguished figure in surgery and academia, added an air of exquisite dazzle to the event. The Guest of Honour, Professor Deepika Udugama, Chair Professor of Law and Head of the Department of Law at the University of Peradeniya, contributed a unique perspective to the intersection of law and medicine. Their presence underscored the importance of interdisciplinary collaboration and academic excellence in shaping the future of healthcare and medical education in Sri Lanka.

SLMA Congress

The congress kicked off with a thought-provoking keynote address that illuminated the core theme of Clinical Excellence "Excellence in Healthcare: Doing the right thing right by Professor Senaka Rajapakse, Director of The Postgraduate Institute of Medicine Colombo. This was followed by the Professor N. D. W. Lionel Memorial Oration delivered by Professor Athula Sumathipala on "Starting from scratch, the first and the largest twin research programme in Low-and Middle-Income Countries (LMIC); the Sri Lankan Twin Registry, its research output and impact"







The three days of the congress were dedicated to going with the theme commencing from Excellence on the first

day, Equity on the second day and Community on the third day. The sessions were organized in parallel, with one track focusing on clinical medicine and the other on public health.

The four guest lectures were equally compelling, with experts presenting breakthroughs in disaster preparedness, healthcare policy, thyroid care in general practice and innovative patient-centred approaches. These lectures provided attendees with a broader perspective on the multifaceted nature of contemporary healthcare challenges and solutions.



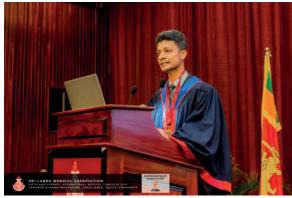


The congress featured three insightful panel discussions that explored pertinent topics. These were Pathways to Excellence in Healthcare that included Preventive Health discussed by Dr Deepika Atigala , Laboraotry Services discussed by Dr Gaya Katulanda and Curative Care, covered by Professor Thilak Weeraratne. The equity and Health Panel Discussion focused on, "Human Resources and Maldistribution" discussed by Professor Dilip De Silva "Financing and out-of-pocket expenses" addressed by Professor Amala de Silva and "Narrowing Inequities" presented by Dr Vinya Ariyaratne. These discussions

sparked intense interactions, with the presentations of diverse viewpoints from panellists and attendees alike.

The symposia, totalling sixteen, covered an array of medical domains, ranging from sports medicine, arts and humanities, breakthroughs, to advancements in smart hospital perspectives to clinical medicine topics such as metabolic medicine, air pollution and community geriatrics. Each symposium provided a platform for experts to share their cutting-edge research and insights.









Exciting SLMA Debate

A highlight of the congress was the electrifying debate on the controversial topic of "Private Medical Education as a Viable Option in Sri Lanka", sparked engaging discussions and verbal thrusts from the debaters, probing the potential benefits, challenges and the perceived disadvantages of introducing private institutions into the country's medical education landscape. The discourse revolved around striking a balance between maintaining high educational standards, ensuring affordability, and promoting equitable access to medical education. Participants delved into the intricate intersections of quality control, financial accessibility, and the nation's commitment to healthcare equality, providing valuable insights into the multifaceted implications of considering private medical education as a viable path for Sri Lanka.

The culmination and future prospects

The SLMA 136th Anniversary International Medical Congress finally even transcended its role as a mere scientific gathering. It emerged as a unifying force that rekindled the commitment of medical professionals to deliver healthcare with compassion and excellence while striving for equitable outcomes across diverse communities. As the event drew to a close, participants departed with a renewed sense of purpose and a shared dreams and vision of a more humane and collaborative healthcare landscape.















DAY 02





























































DAY 03



























DAY 04



















Docs are a Serious Lot? No, No., Not by a Long Stretch

Narrative inscribed by **Dr B. J. C. Perera**Specialist Consultant Paediatrician

Rumour has it that the Western Allopathic Doctors are a serious lot; all work and no-play types. Well, if you were there at the Sri Lanka Medical Association Doctors' Concert on Friday the 28th of July 2023 evening at the Lotus Hall in BMICH, you may have had to change your mind.

It was a scintillating presentation of music, song, dance, skits, drama., you name it, it was all there. The talent displayed was totally unbelievable and the end result was an artistic extravaganza of the highest-octane level.

Beautifully choreographed by our own Dr Nilanka Anjalee

Wickramasinghe, the well-known vocalist and musician, ably assisted by Dr Pramilla Senanayake our Social Secretary, with renowned dancing skills..., the performers really surpassed even the best of themselves. That virtuoso of the music scene, Dr Christo Fernando, who was the livewire behind the event for the last couple of decades, handed the baton over to young Nilanka this year and didn't she do fabulously well?

The costumes and the attire displayed by the performers were absolutely magnificent. The most outstanding feature was the variety of the presentations which were designed to titillate the artistic palate of even the most discerning connoisseur in performing arts. In

fact, the hall was chock-a-block full and even overflowing with members of the audience who had come to put their hair down and enjoy an evening of lilting splendour.

It was that gorgeous singer Vanessa Williams who released her chart-topper "Save the Best for Last" in January 1992. The Doctors Concert too showcased perhaps the very best of the evening as the swansong, by the Council. It was a medley of Sinhala, English and Tamil songs, seamlessly merged with background videos running; a musical masterpiece.

All in all, a night to remember. Dreams are made of this !!!!





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1.Fetterplace et al. JPEN 2018;00:1-11. 2. Singer et al. 2019. ESPEN guideline on clinical nutrition in the intensive care unit. Clinical Nutrition 2019 (48-79)





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Launch of the SLMA Guidelines and Information on Vaccines 8th Edition 2023

The 8th edition of SLMA Guidelines and Information on Vaccines 2023 was launched at the Inauguration Ceremony of the 136th Anniversary International Medical Congress on 25th July 2023.

Professor Pujitha Wickremasinghe, Senior Professor in Paediatrics, University of Colombo delivered a short review of the book.

The book was ceremonially handed over by Dr Lucian Jayasuriya, Senior Joint Editor to the Chief Guest. Emeritus Professor Mohan de Silva, Guest of Honour, Professor Deepika Udugama, President SLMA, Dr Vinya Ariyaratne, Honorary Secretary SLMA, Dr Sajith Edirisingha, SLMA Orator 2023, Dr Namal Ratnayake and the Reviewer Professor Pujitha Wickremasingha.

This book which has 496 pages, has 40 chapters and 30 contributors.

Copies of the book were given free of charge to those who registered for the Congress. It will be available for sale at Rs 1000 for members of the SLMA and Rs. 1250 to non-members of the SLMA. I will be available for sale at the SLMA office and in the SLMA website slma. Ik. An electronic copy which may be downloaded will be available at the SLMA website.













Contribution made to advances in knowledge on snakebites

Dr. R.M.M.K. Namal Rathnayaka

MBBS, MPhil (Toxinology), MA, MSc (Medical Toxicology), MSc (Clinical Pharmacology & Therapeutics), PGDip. Toxicology, PGDip.Buddhist studies, Dip.OH&S, PGCert.MedEd Department of Pharmacology Faculty of Medicine, Sabaragamuwa University of Sri Lanka.

Sri Lanka has been reported to have one of the highest snakebite rates in the world and on the current data, the inland snake fauna comprises at least 108 species including 92 land snakes, 15 sea snakes and a water snake which lives in brackish water. Out of these, 58 snake species are endemic to Sri Lanka; a country that is considered to be a country with the highest biodiversity because of its flora and fauna. Snakes contribute a lot to this motherland's biodiversity. These snakes comprise 12 families and 37 genera and interestingly, we have one endemic genus called *Rhinophis* ('Thudulla'/'Walga abaya').

Basically, snakes are classified into venomous and nonvenomous types from which venomous snakes are classified into two, including highest medically important and lesser medically important snakes. Accordingly, highest medical important snakes are hump-nosed pit viper (HNPV-'Kunakatuwa'/'Polan thelissa'), Russell's viper (RV-'Thith polanga'), cobra ('Nagaya'), common krait ('Thel karawala'), saw scaled viper ('Weli polanga'), Green pit viper ('Pala polanga'), Ceylon krait ('Mudu karawala') and sea snakes (Figure 1). Lesser medically important snakes are cat snakes ('Mapila'), coral snakes ('Depath kaluwa'), flying snakes ('Dagara danda' and 'Mal sara'), Sri Lankan blossom krait ('Nihaluwa'), vine snakes ('Ahatulla' and 'Henakadaya'), Dog faced water snake ('Kunudiya kaluwa') and Gerard's water snake ('Kadolana diya bariya') [Figure 2].



Figure 1: Highest medically important land snakes of Sri Lanka: (A) Russell's viper (B) Hump-nosed pit viper (C) Saw-scaled viper (D) Common krait (E) Green pit viper (F) Ceylon krait (G) Cobra

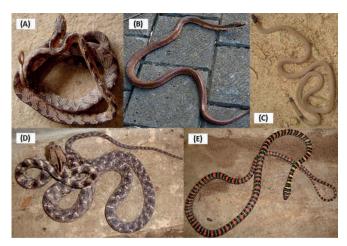


Figure 2: Some of lesser medically important snakes of Sri Lanka: (A) Sri Lanka cat snake ("Nidi Mapila") (B) Sri Lankan blossom krait ("Nihaluwa") (C) Slender coral snake ("Depath kaluwa") (D) Forsten's cat snake ("Naga Mapila") (E) Onate flying snake ("Mal sara")

Highest medically important snakes of Sri Lanka belong to 2 Families including Family Viperidae and Elapidae. Family viperidae includes true vipers and pit vipers. True vipers are RV and saw-scaled viper. Pit vipers are HNPV and Green pit viper. The basis of this division is the presence of pit organ or the Loreal pit in between the nostril and the eyes of these pit vipers. The Pit Organ helps these snakes to feel sensations. Family Elapidae includes kraits, sea snakes and the cobras. Sea snakes are also included into the subfamily Hydropiinae.

Hump-nosed pit viper bites

The World Health Organization (WHO) classified snakebite as a neglected tropical disease. In 2010, it listed the highest medically important snakes of each part of the world under Category I snakes which require antivenom [1]. In South Asia, HNPV or *H. hypnale* has been included in this classification because of its severe venom effects. But, in Sri Lanka or India no antivenom is currently available for HNPV bites, even though it causes severe systemic manifestations such as acute kidney injury (AKI), venom induced consumption coagulopathy (VICC), thrombotic microangiopathy (TMA) and cardiotoxic effects.

Hump-nosed pit vipers of the genus *Hypnale* are the commonest cause of venomous snakebites in Sri Lanka which is 22 to 77% of all snakebites [2]. It is a small snake less than 60 cm in length. There are 3 species of the genus including *H. hypnale*, *H. zara* and *H. nepa* from which the latter two are endemic to Sri Lanka and the first is also found in Western Ghats region of India. Most bites occur from *H. hypnale* [3] and therefore, it was

the subject of several publications. However, no major clinical studies have been done regarding *H. zara and H. nepa* bites. The clinico-epidemiology of the 3 species have been studied separately and found to have no significant differences in causing envenoming effects among these 3 species [3].

In a prospective clinical study involving 480 patients with proven HNPV envenoming, *H. zara* bites accounted for 105 which is 22% of all *Hypnale* bites from which local effects were present in 100 (95%) and systemic manifestations were seen in 5 (5%) including AKI, VICC and TMA. This study shows that *H. zara* bites mainly cause local envenoming and only rarely produce systemic effects. Further, it was found that eosinophilia is a significant finding [4].

Clinical profile of *H. nepa* envenoming is so far poorly understood. This is because their biting frequency is very low, as they are confined only to the central hills of the country. In a prospective clinical study of proven HNPV envenoming, there were 14 (3.6%) patients with *H. nepa* bites. Local envenoming was observed in all patients including local pain and swelling, each one having local bleeding and lymphadenopathy. Systemic manifestations were found in 2 (14%) including microangiopathic haemolytic anaemia (MAHA) and sinus bradycardia. In conclusion, *H. nepa* bites frequently cause local envenoming. However, rarely systemic manifestations may occur [5].

In another clinical study done in Teaching Hospital Ratnapura, involving 465 patients with HNPV bites, 44 (9.5%) developed AKI, 9 (2%) progressed to chronic kidney disease (CKD) and 25 (5%) had TMA, from which 24 (5%) developed haemolytic uraemic syndrome (HUS) and 1 (0.2%) had thrombotic thrombocytopaenic purpura (TTP). Twenty-nine (6%) showed MAHA and 30 (6.5%) had thrombocytopaenia. Oliguria was seen in 17 (3.7%) and 12 (2.6%) had anuria. Nineteen (4%) developed haematuria. Proteinuria was seen in 18 (3.9%). It was concluded that a significant proportion of patients develop AKI following HNPV bites [6].

In another study assessing the long-term health effects of HNPV bites, it was found that 3% of all bites progressed to CKD and these patients needed lifelong renal replacement therapy either haemodialysis or kidney transplant. Further, it was revealed that TMA is a risk factor of developing CKD in these patients (Odd ratio-4.35, 95% CI 1.167-16.02) [7]. Also, it was found that 6% of all HNPV bites develop VICC. Treating VICC is a challenge to clinicians in a state where antivenoms are not available. This study shows that fresh frozen plasma (FFP) has only doubtful efficacy in early correction of VICC [8]. Coagulopathy results from the activation of the clotting pathway by procoagulant toxins in the

venom of HNPV and RV. Thrombin-like enzymes (TLEs) or fibrinogenases are the procoagulants in genus *Hypnale* venom which are zinc metalloproteinase. They simply consume fibrinogen rather than activating the clotting pathway. Intracranial, pulmonary and myocardial haemorrhages are the worst complications of VICC, which have fatal outcomes. A 66-year-old male died on day 4 of *H. hypnale* bite due to pulmonary and intracranial haemorrhages [9].

Considering the cardiotoxic effects, we found atrial fibrillation, myocardial infarction (MI), acute ischaemic changes, arrhythmias and Kaunis syndrome following HNPV bites [10],[11]. Fibrin thrombi may block the coronary vessels resulting in ischaemic changes to the myocardium. This may be partial occlusion causing acute ischaemic changes and non-ST elevation MI (NSTEMI) or complete block resulting in STEMI. Kounis syndrome occurs due to the spasms of coronary vessels. The effects of Hypnale venom may be very severe, even resulting in sudden deaths. There is evidence that a sudden death occurred approximately 45 minutes after a HNPV bite. A 60-year-old male, diabetic estate worker was bitten by a H. hypnale on his foot while he was working in an estate around 10.30 morning. He killed the snake, came back home by his three-wheeler around 10.45 AM, told the story to his wife, and identified the snake as "Polon thelissa". They planned to go to a nearby local hospital situated about 8 km away from the house. At that time, he had mild pain at the site of bite and few drops of bleeding. While he was changing his shirt, he collapsed and complained about pain in his left arm. He was carried to the local hospital at about 11.15 morning. He did not speak on the way to the hospital, and upon arrival he was declared dead by the admitting medical officer. His autopsy examination showed pulmonary and myocardial haemorrhages [12]. A 42-year-old previously healthy male died 16 days after a H. hypnale envenoming due to multi-organ failure. On admission, he had a cardiac arrest and recovered with cardiopulmonary resuscitation and then developed atrial fibrillation which was reverted to by synchronized electrical cardioversion [10]. Cardiac complications are rarely reported following HNPV bites and clinical reports of coronary vasospasm following snakebites are extremely rare in the literature. Kounis syndrome, which is an allergic acute coronary syndrome was observed in a 47-year-old male who was bitten by a H. zara. He had transient ST elevations in ECG without having elevated cardiac enzymes. This is the first report of coronary vasospasm following HNPV bites in the world [11].

TMA is a common clinical manifestation of Viperidae snakebites in Sri Lanka which is observed in HNPV, RV and saw-scaled viper bites [13]. We observed TMA including HUS and TTP following *H. hypnale* and *H. zara*

bites [13], [14], [15]. TMA is a clinicopathological condition which includes the triad of MAHA, thrombocytopaenia and microvascular thrombi that cause end-organ damage like AKI, pituitary infarction, and digital gangrene. The recognized syndromes associated with TMA are HUS and TTP which have almost similar clinical and laboratory features and are therefore, known as TTP/ HUS clinical syndrome. Microangiopathic haemolysis or MAHA is another systemic effect of HNPV bites which is caused by all 3 species [16]. Thrombin-like enzymes in Hypnale venom activate clotting pathways leading to the formation of thrombi and depositing them as fibrin causing vascular occlusion, resulting in a reduction of the blood supply to the organ. This may commonly occur in vessels of the kidneys, brain, heart or pituitary gland. When red blood cells flow through these partially blocked vessels, they get distorted and are seen in peripheral blood as schistocytes or fragmented red blood cells. This condition is called microangiopathic haemolysis.

We have observed several systemic manifestations of HNPV bites. Purpura fulminans is a rare complication of snakebites. Although it is described in text books, reports on snakebites are hardly found in the literature. It is a rapidly progressive, life-threatening thrombotic disorder characterized by progressive haemorrhagic infarction, tissue necrosis, and intravascular thrombosis, typically involving small dermal vessels. A 58-year-old female was bitten by a *H. Hypnale* and developed bilateral toe gangrene, and ultimately ended up with amputations. She recovered with loss of toes in both feet following 46 days of treatment at the hospital [17].

Extensive literature search did not reveal situations of the appearance of ecchymotic patches similar to the case described here. Ecchymoses are subcutaneous spots of bleeding with a diameter larger than one centimetre. A 74-year-old previously healthy female was bitten by a H. hypnale at dusk causing incoagulable blood lasting for 6 days. Further, she developed ecchymoses over her forearms, upper arms, hands and lower back on day 4 following snakebite [18]. Features of this nature are rarely heard of or seen following HNPV bites. Ischaemic cerebral infarcts may also occur due to prothrombotic effects of Hypnale venom. In-vitro studies confirmed that Hypnale venoms have potent cytotoxic, mild procoagulant, weak neurotoxic and myotoxic activity [19]. But clinically, we did not observe neurotoxic features in these patients. A 71-year-old male presented with left-sided hemiparesis with mouth deviation on day 2 following a HNPV bite on the left foot. CT brain showed a right ischaemic stroke in the internal capsule. He was given supportive treatment including antiplatelets and statins. He recovered completely and was discharged on day 4 with clinic follow up [20]. In the absence of antivenom, we

tried to establish the effectiveness of therapeutic plasma exchange (TPE) for TMA patients following HNPV bites. A prospective observational study was conducted in Teaching Hospital Ratnapura for 6 years commencing in June 2015 including patients with TMA caused by *Hypnale* bites. Some of these patients underwent TPE and some did not. These two groups were compared. It was concluded that TPE is effective for TMA in the early correction of platelet counts, MAHA, PT/INR and WBCT20 in HNPV bites [21].

Virtually all studies on HNPV bites have been focused on adults. Therefore, the understanding of the epidemiological and clinical profile of snakebites in children is lacking and are therefore poorly characterized. A prospective observational study was conducted aiming to describe the clinico-epidemiology of HNPV bites in children. There were 40 (56%) HNPV bites in this study. Local envenoming was observed in 38 patients (95%) and systemic effects developed in 4 (10%) as mild VICC. Local effects include local pain (n=30; 94%), swelling (n=38;95%), blistering (n=11;27.5%), necrosis at the site of bite (n=11; 27.5%), regional lymph node enlargement (n=8;20%) and local bleeding (n=4;10%). For the local effects, surgical interventions were needed in 10 children (25%) and 3 (7.5%) of them developed acute compartment syndrome leading to fasciotomy. Leucocytosis (n=28;78%) and eosinophilia (9;27%) were the prominent haematological findings. All got recovered except in patients with fasciotomy who got permanent scar. In conclusions, HNPV bites mostly cause local effects and rarely lead to systemic manifestations in children. In them, a compartment syndrome is common. Children with these bites should be closely monitored in order to detect acute compartment syndrome early and to prevent permanent loss of limbs [22].

Green pit viper bites

Green pit viper is a venomous endemic snake in Sri Lanka. But little was known regarding its envenoming in the country. When I started the work on its bites, there were no studies or no management guidelines regarding its bites in the country. This was the first study that was carried out in order to find out the epidemiology and clinical profile of its bites. A series of 17 patients with Green pit viper bites were prospectively studied over 4 years, both in District Hospital Kolonna and Teaching Hospital Ratnapura. Sixteen (94%) developed local envenoming features including local pain, swelling, local bleeding, lymphadenopathy and blistering. Systemic envenoming developed in 4 (24%) including 3 with VICC that were treated with FFP. One (6%) patient developed sinus bradycardia. It was concluded that green pit viper bites commonly cause local envenoming and rarely VICC. As there is no antivenom, VICC with clinical bleeding was treated with FFP in these bites [23].

Extensive local swelling is the key local effect of green pit viper bites and therefore, these patients should be closely monitored in order to detect compartment syndrome, which will need early fasciotomy [24]. Many people benefitted from these studies on HNPV and Green pit viper bites because they contributed a lot to formulating management guidelines for snakebites in Sri Lanka [25].

Russell's viper bites

Russell's viper is a widely distributed highly medically important snake, which in Sinhala it is called 'Thith polanga' alluding to the ovular spots on the skin. It is responsible for 30-40% of all snakebites in the dry zone of the island and is the leading cause of snakebite deaths in Sri Lanka [26]. Neuroparalytic features including ptosis and external ophthalmoplegia, VICC and AKI are common manifestations of its bites whereas cardiotoxic effects, respiratory failure and cerebral manifestations are rarely observed and therefore poorly understood. In a prospective observational study of 42 patients with RV bites, 13 patients (31%) showed cardiac manifestations including 6 (46%) who had sinus bradycardia; 3 (23%) showed ischaemic changes; 2 (15%) showed STEMI and one each (7.7%) had sinus tachycardia and atrial fibrillation. One (7.7%) died on admission and his post-mortem examination revealed sub-endocardial haemorrhages [27]. Myocardial infarction is an atypical feature of an RV bite. A 60-year-old businessman was admitted following an RV bite. He complained of central non-radiating chest pain associated with sweating. ECG showed ST elevation on limb leads and chest leads and cardiac enzyme, troponin I was elevated. 2D-echocardiogram showed normal cardiac findings including ejection fraction of 60%. He was treated with 20 vials of Indian polyvalent antivenom. The patient initially developed MI and later, VICC and neuroparalysis [28].

It is not uncommon to see atypical manifestations in RV bites. We reported the events of intracranial haemorrhages and multiple ischaemic brain infarcts in a previously healthy 43-years-old male who succumbed to envenoming. Interestingly, this same patient had both cerebral ischaemic infarction and haemorrhage [29]. Late onset of cerebral infarction following an RV bite was also described. A 53-year-old male presented with an RV bite to his right leg. He developed AKI and respiratory failure and intubated and was given ICU care. On day 21 of snakebite, he was found to have left sided weakness of the body and revealed bilateral cerebral infarction in the CT the brain. However, the patient died on the 26th day following the snakebite due to complications of acute ischaemic stroke and AKI [30]. A 30-year-old previously well male was bitten by an RV on his left foot and had a prolonged whole blood clotting test and INR

associated with haematuria, followed by respiratory failure for which he was intubated. He had blood-stained endotracheal tube secretions suggestive of pulmonary haemorrhage, confirmed by a high resolution CT chest. He also developed AKI, rhabdomyolysis and deep vein thrombosis. He completely recovered and was discharged on day 23 [31]. We also found that compared to the dry zone, there is a higher incidence of TMA in the wet zone following RV bites which was 20% (11 out of 56). Russell's viper bites in the wet zone showed two extremes of manifestations; high dry bite rate and high death rate. The incidence of TMA and cardiac manifestations are also high in this region [32]. Further, it was reported that 2 patients with RV envenoming developed HUS and TTP and recovered completely with antivenom, haemodialysis and TPE [33].

Ceylon krait bites

Ceylon krait is also a highly medically important elapid, endemic to Sri Lanka. Its habitat is mainly in the wet zone of the island. Out of 2 kraits in Sri Lanka, confirmed Ceylon kraits encounters are extremely rare in the literature and confined to very few cases including one of fatal envenoming which was published in 1993 by de Siva et al [34]. Due to un-witnessed night bites and rare occurrences, the clinical manifestations and natural history of envenoming by the Ceylon krait have not been well studied and documented. After over 2 decades, we reported two confirmed cases of Ceylon krait bites; one being a dry bite and the other with signs and symptoms of moderate envenoming. The envenoming occurred at night while the victim was asleep, causing tightness in the chest and dyspnoea on waking up, followed by neuromuscular paralysis that did not cause respiratory failure. Complete recovery was seen 3 days after the bite [35]. Another study describes two cases of proven Ceylon krait bites of two young snake keepers working in a serpentarium in Peradeniya. They developed acute neuro-paralysis and a period of amnesia. Both recovered with some long-lasting clinical disabilities including impairment of sensation of the bitten arm, persistent refraction errors in eyes and persistent marked nystagmus [36].

It is of interest to note that there are 5 non-venomous snakes in Sri Lanka called wolf and bridal snakes having similar morphological appearance to kraits causing identification difficulties which lead to unnecessary, unindicated administration of antivenom. These snakes are 3 wolf snakes and 2 bridal snakes including the common wolf snake or "Alu Radanakaya", Show's wolf snake or "Kabara Radanakaya", Sri Lankan wolf snake or "Daara Radanakaya", common bridal snake or "Geta Radanakaya" and Chithrasekara's bridal snake. We commonly encounter these non-venomous similar-looking snakes from all over the country. However, kraits

can be identified by looking at large hexagonal vertebral scales whereas, in nonvenomous wolf snakes or bridal snakes, all dorsal scales are same in size. We reported two paediatric cases of proven Ceylon krait bites and three adult patients with similar-looking non-venomous snakebites. These children were 1½ and 13 years old respectively and developed neuro-paralysis without progressing to respiratory failure and recovered [37].

Cat-eyed snake bites

Cat snakes are lesser medically important snakes in Sri Lanka because their bites are known to cause only mild local effects such as local pain and swelling at the site of the bite. There are 5 species of cat snakes in Sri Lanka, of which 3 are endemic. They are called cat-eyed snakes because they have vertical elliptical pupils like in cats. Even though they are widely distributed all over the country and more people are bitten, the biting records were not available except in one document described by Dr Anslem de Silva about a bite on himself [38]. We studied 7 cases of cat snake bites, including six adults and one child. Of them, 5 developed only mild local effects and two did not have any symptom. Any of them did not develop systemic manifestations [39].

In consideration of all this evidence, it is obvious that the most medically important snake in Sri Lanka is HNPV. Hopefully, this will be changed in the near future, because we are in the process of developing an antivenom for HNPV bites.

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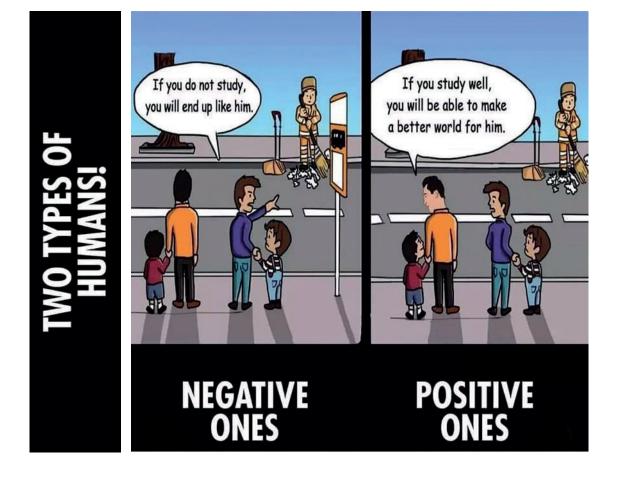


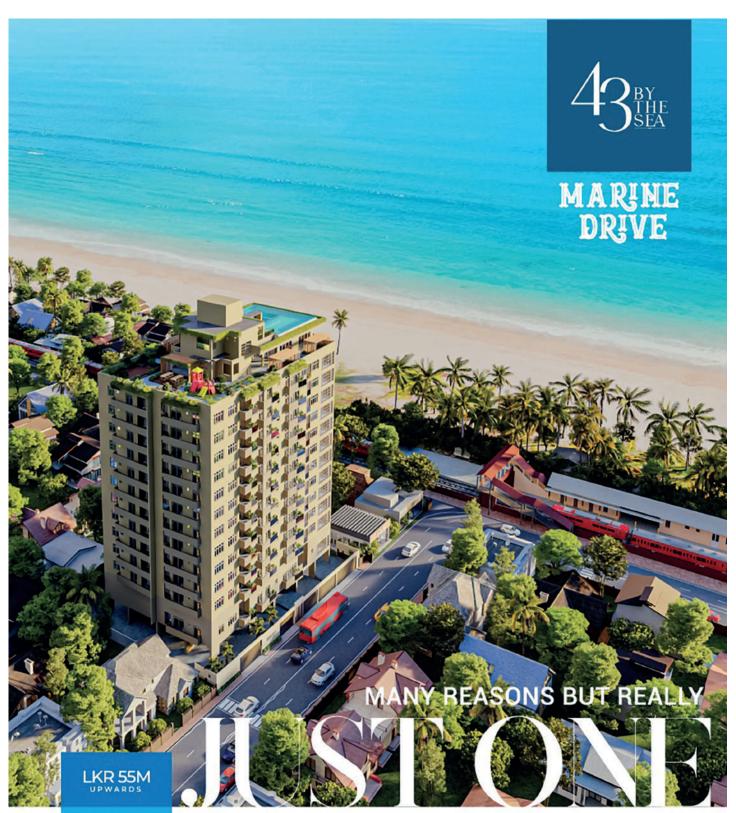


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