

Review Article

Applicability of internal preparations for viper venom (polon visa) in treating dengue hemorrhagic fever

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ABSTRACT

Dengue is a worldwide major public health problem. Severe Dengue Fever causes Dengue Hemorrhagic Fever that can be correlated with *Raktaṣṭivi Sannipātaja Jvara*. Ayurveda explained disease causes for a new disease (*Nidānārthakara Roga*), it said that hemorrhagic manifestations (*Raktapitta*) may be resulted from a fever (*Jvara*) in high temperature. Data has been obtained from main Ayurveda texts *Caraka*, *Sūsruta*, *Aṣṭāṅga Saṁgraha*, *Mādhava Nidāna*, *Bhāva Prakāśa*, and *Talpatē Piliyam*, the Sri lankan traditional text book and from the scientific web journals. Recipes found for *Polon Viṣa* in *Talpatē Piliyam*. Data of pharmacodynamics were analyzed in percentage. Three dosage forms found from the *Talpatē Piliyam*. In the collected 146 formulae for *Polon Viṣa*; 91 fresh juice extracts (*Yuṣa*), 51 gruel (*Kenda*) and 4 decoctions (*Kaṣāya*). Most frequently used ingredients of all formulae had four pharmacodynamic effects i.e; *Kaṣāya Rasa*, *Laghu Guṇa* and *Kaṭu Vipāka*. *Śīta Vīrya*. Collectively they have the counteracting effects for hemorrhagic condition in Dengue Hemorrhagic Fever. Antipyretic actions of the ingredients, Pacify *Rakta* and *Pitta* disorders, Anti hemorrhagic, and hepatoprotective were main actions of the ingredients. The aforementioned facts lead to the conclusion that the pharmacodynamics and specific actions of these ingredients aid in halting the pathogenesis (*Samprāpti Vighaṭana*) of Dengue Hemorrhagic Fever. Notably, the ingredients *Bo* (*Ficus religiosa*), *Karalhaba* (*Achyranthes aspera*), *Iguru* (*Zingiber officinale*), *Madurutala* (*Ocimum sanctum*), *Heerassa* (*Cissus quadrangularis*), and *Rasakinda* (*Tinospora cordifolia*) are highlighted as having potential for oral preparation to treat DF and DHF based on their pharmacodynamic profiles.

Key words: Dengue Hemorrhagic Fever, *Daṇḍaka Jvara*, *Raktaṣṭivi Sannipātaja Jvara*, Viper venom

Hemorrhage, or bleeding, is a medical condition that poses a life-threatening risk when occurring frequently in an individual. Regardless of its cause, prompt medical intervention is crucial to preserving the life of the victim. Ayurveda delineates various hemorrhagic conditions, including *Raktaja Atīsāra*, *Raktaja Pravāhika*, *Raktaja Arśas*, *Rakta Pradara*, *Kṣataja Kāsa*, *Raktapitta*, and specific types of *Jvara*, as well as in viper poisoning. The description of dengue as *Daṇḍaka Jvara* is found in the *Paṛiśiṣṭa Saṁgraha* of *Mādhava Nidāna*, attributing a particular species of mosquito bite as the fundamental cause of the fever known as *Daṇḍaka Jvara* [1]. Premonitory symptoms (*Pūrvarūpa*) include *Aṅgamarda* (body ache), *Klama* (sluggishness without effort), *Aruci* (anorexia), nausea, and *Avasāda* (depression) [2]. Symptoms of *Daṇḍaka Jvara* involve severe breaking pain in bones and joints, fever that

may subside and relapse, *Viṣarpa*, *Śoṭha*, symptoms resembling common cold (*Pratiśyāya*), cough, and throat pain. *Daṇḍaka Jvara* becomes endemic due to the virulence of *Kapha* and *Vāta Doṣa*, posing higher risks for children and the elderly [3].

Symptoms of *Raktaṣṭivi Sannipāta Jvara*, according to *Paṛiśiṣṭa Saṁgraha*, include constant blood emission from the oral cavity, urticarial rashes throughout the body, reddened sclera, thirst, loss of appetite, vomiting, dyspnea, diarrhea, vertigo, distended abdomen, loss of consciousness, inability to sit or stand, hiccough, and severe body pain [4]. In Toxicology (*Āgada Tantra*), snakes (*Sarpa*) and insects (*Kīta Viṣa*) fall under *Jangama Viṣa* [5]. This externally caused situation is listed under the twofold category of diseases falling under *Āgantuja Nimitta Hētu*. The Viper (Viperidae family) is a relevant snake studied under the category of Snakes (*Sarpa*), which correlates with Dengue hemorrhagic conditions symptomatically and pathologically when the disease

Access this article online

Received – 06th Jan 2024Initial Review – 11th Feb 2024Accepted – 26th Feb 2024

Quick Response Code

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virulence reaches a higher level. The aim of this research is to study the applicability of treating Dengue Hemorrhagic Fever (DHF) with Viper Venom (*Polon Viṣa*), comparing it with other situations in the pathological process of both conditions. Although a vaccine (Dengvaxia®) is licensed and available for dengue prevention in some countries, the World Health Organization recommends its administration only to persons with confirmed prior dengue virus infection. Moreover, individuals who receive the vaccine without prior infection may be at risk of developing severe dengue if subsequently exposed to the virus [6]. Therefore, this study aims to find a traditional remedy for DHF, proving the potential of Sri Lankan Traditional Treatment for a condition symptomatically and pathologically similar, i.e., Viper Envenomation.

Review of DHF in Ayurveda perspective

Allopathic patho-symptomatic explanation of Dengue Fever:

Dengue fever results from the infection of the dengue virus (DENV), a member of the Flaviviridae family transmitted through mosquito bites. The virus has four distinct serotypes: DENV-1, DENV-2, DENV-3, and DENV-4, with the possibility of multiple infections over time. Lifelong immunity is conferred against the specific serotype responsible for a previous infection. The World Health Organization (WHO) categorizes dengue into two main types: dengue (with or without warning signs) and severe dengue. The onset of dengue is marked by a sudden high fever (40°C/104°F) accompanied by various symptoms, including severe headache, eye pain, muscle and joint pain, nausea, vomiting, swollen glands, and characteristic rashes. During the critical phase, occurring approximately 3-7 days post-onset when fever subsides (below 38°C/100°F), warning signs of severe dengue become apparent. These signs include plasma leakage, fluid accumulation causing dehydration and shock, respiratory distress due to lung involvement, severe bleeding tendencies, and potential organ impairment [7].

Symptomatological Study of Viper Bite Poisoning (*Māṇḍali Viṣa*):

According to *Suśruta Saṃhitā* Snakes are of 3 kinds - *Dārvikara*, *Māṇḍali*, *Rajīman*. The viper is under *Māṇḍali Varga*. And Viper cause aggravation of *Pitta Doṣa*. *Māṇḍali* snake causes yellowing of the skin etc. desire for cold, burning sensation, thirst, narcosis, fainting, fever, hemorrhage above and below, putrefaction and falling off of muscles, narcosis of biting site, vision of yellow sights, quick anger. *Māṇḍalika Viṣa Vega*: In the first stage, vitiated blood, which acquires yellow tone and a feeling of burning sensation. In the second stage it vitiates muscles, which causes marked yellow color, there will be generalized burning sensation, swelling at the site of the bite. In the third stage it vitiates fat, which cause stiffness of the eye, thirst, moistness at the site of the bite and perspiration. In the fourth stage it enters into the thoraco abdominal cavity and produces fever. In the fifth stage it produces a feeling burning all over the body. In the sixth

stage, it enters marrow and vitiates *Grahaṇī* greatly; by that, there will be a feeling of heaviness of the body, diarrhoea, cardiac pain and fainting. In the seventh stage poison enters into semen, highly vitiates *Vyāna Vāyu* and causes discharge of *Kapha* from minute channels, cutting pain in the waist and back, loss of all movements, more elimination of saliva and sweat and obstruction of expiration [8].

Viper Venom - Allopathic perspective: The viper venom is a yellowish fluid containing a variety of 25 proteins and peptides going about as enzymes and ligands which different impacts bring about immobilizing the victim and initial digestion of tissues surrounding the bite site. The components present in the viper venom, for example, the hydrolases of peptides, hyaluronidases, phospholipases and proteases give cytotoxic impacts, lead to homeostatic imbalance, cause oedema, hypovolemia and extravasation of plasma to extravascular space as the aftereffect of endothelium harm. Given the side symptoms intensity, the seriousness of envenomation is arranged into four-grade scale: Grade 0 (G, 0) - “dry” bite without envenomation, the presence of venom teeth marks. G-1 – envenomation of mild course, only local oedema is present with the peak observed after 1-2 days. G-2 – moderate envenomation accompanied by regional swelling of limb and poorly noticeable general symptoms (moderate vomiting, abdominal pain, diarrhea, moderate BP fluctuation, tachycardia, hypertonia) G-3 – severe envenomation characterized by extensive oedema spreading proximally and the presence of life-threatening general symptoms (significant or prolonged hypertonia, hemorrhagic shock). The severity of envenomation is dependent on the volume of venom injected related to the body mass [9].

MATERIALS & METHODS

This research was designed as a literature review of an Applicability of Internal Preparations for Viper Venom (*Polon Viṣa*) in Treating DHF. Data collected from Ayurveda authentic texts such as *Caraka Saṃhitā*, *Suśruta Saṃhitā*, *Aṣṭāṅga Saṃgraha*, *Mādhava Nidānaya*, *Bhāva Prakāśa* and relevant articles and researches through the Internet. Available 146 oral liquid preparations (fresh juice extracts-*Yuṣa*, gruel - *Kenda*, decoctions-*Kaṣāya*) for Viper Venom (*Polon Viṣa*) collected from *Talpatē Piliyam* (Vol. - 1, 7, 9, 11, 13, 14, 17, 18, and 20).

RESULTS

Most frequently used medicinal plants for *Polon Viṣa* mentioned under book series of *Talpatē Piliyam* are *Demata* (*Gmelina asiatica*), *Rukattana* (*Alstonia scholaris*), *Kotadibula* (*Ficus hispida*), *Ratmal* (*Ixora coccinea*), *Ibul* (*Bombax malabaricum*) *Korossa* (*Tetracera sarmentosa*), *Kamburu* (*Caesalpinia bonduc*), *Iguru* (*Zingiber officinale*), *Wara* (*Calotropis gigantea*), *Hirassa* (*Cissus quadrangularis*),

Welmadata (Rubia cordifolia), Nuga (Ficus bengalensis), Atemata (Gmelia arborea), Welmi (Glycyrrhiza glabra), Karalhaba (Achyranthes aspera), Ranawara (Cassia auriculata), Pitawakka (Phyllanthus debilis), Madurutala (Ocimum sanctum), Penela (Cardiospermum haliacabum), Idda (Walidda antidysenterica), Sudulunu (Allium sativum).

When analyzing the pharmacodynamic properties of most frequently used herbs for Viper Venom;

- *Rasa* of those herbs contains 35.8% *Kashaya*, 30.7% *Tikta*, *Madhura* and *Katu* equally presented that of 15.4%, 2.5% *Amla*.
- Out of *Guna Laghu guna* 31%, *Ruksha* 25%, *Theekshna* & *Snigdha* 14%, *Guru* 11%.
- 56% herbs contain *Śīta Vīrya* rest are *Uṣṇa Vīrya*.
- Out of *Vipāka* 69% *Katu*, 25% *Madhura* and 6% *Amla*.

According to *Bhāva Prakāśa*, treatment formulae for *Raktaṣṭhī Sannipāta Jvara* are Decoction of *Rohisa* grass, *Dhanvayāsa*, *Yavāsa*, *Vāsā*, *Parpāṭaka*, *Priyangu* and *Kaṭukarohini* mixed with sugar, Decoction of *Padmaka*, *Candana*, *Parapata*, *Mustaka*, *Jati*, *Jivaka* and *Candana* and Cold infusion of *Yasti*, *Madhuka*, *Parusaka*, *Balaka*, *Tejapatra*, *Devadaru* and *Gambhari* fruits [10].

When analyzing the pharmacodynamic properties of herbs in the decoctions used for *Raktaṣṭhī Sannipāta Jvara*;

- *Rasa* of those herbs contains 40% *Tikta Rasa*, 32% *Kaṣāya*, 24% *Madhura*. *Amla* and *Lavaṇa Rasa* were not presented in those ingredients.
- Out of *Guṇa Laghu* 34.78%, *Rūkṣa Guṇa* 26.01%, *Guru* and *Snigdha* equally presented that of 17.39%. *Mrudu* 4.35% presented proportionately in a low ratio
- 78.57% ingredients contains *Śīta Vīrya* rest are *Uṣṇa Vīrya*.
- Out of *Vipāka* 78.57% *Kaṭu*, 21.4% *Madhura*

DISCUSSION

This study, was able to found effective medicinal plants and the preparations for DHF with proving the potential evidences of Sri Lankan Traditional Treatment. Ayurveda explained *Nidanārthakara Roga*, it said that *Raktapitta* (hemorrhagic phenomena) may result from the increased of temperature of *Jvara* (fever). When considering the symptoms of *Raktaṣṭhī Sannipāta Jvara* it can be correlated with DHF since both are having common symptoms of myalgia, arthralgia, generalized body ache, reddened sclera, nausea, vomiting, petiche and hematemeses. DHF is a type of *Sannipātaja Jvara* because it shows symptoms of all three vitiated *Dōṣa* mainly *Pitta Dōṣa*. Treatment formulae for *Raktaṣṭhī Sannipāta Jvara* mentioned in *Bhāva Prakāśa*. Under the explanation of *Viṣa Vēga*,

Ācārya Caraka, Suśruta and *Vāgbhaṭa* describe the way of *Maṇḍalika Viṣa* (Viper Venom) acts on our body. From the Ayurvedic perspective, both DHF and VBHM conditions have the aggravation of *Pitta Dōṣa* and specially the *Rakta Dhātu*. Also affected to *Raktavaha Srōtas* mainly and to Liver (*Yakṛt*) which is the root of *Raktavaha Srōtas*.

When considering the allopathic explanation of the hematological study of DHF and VBHM, both conditions showed Thrombocytopenia, Hemoconcentration and Anemia. In Viper envenomation within the sight of low venom volume-concentration, the coagulability of blood increments while in high focus - the coagulability is diminished so it shows hemorrhagic shock. The severity of envenomation is dependent on the volume of venom injected related to the body mass.

Kaṣāya Rasa, Madhura Rasa, Tikta Rasa, Laghu Guṇa, Śīta Vīrya and *Kaṭu Vipāka* were the most prominent pharmacodynamic properties of the herbs used for *Raktaṣṭhī Sannipāta Jvara* and the herbal ingredients used for Viper Venom. Therefore, the proportions of taste (*Rasa*) experiences in the gustatory sense or the “*Rasa*” are given the effect of pacifying the *Pitta Dōṣa* and prevents the vitiation of *Rakta Dhātu* specially, while *Kaṣāya* and *Tikta Rasa* pacify the vitiated *Pitta* and *Kapha Dōṣa*. *Tikta Rasa* possess *Jvaraghna* action. *Madhura Rasa* pacifies the vitiated *Pitta* and *Vāta Dōṣa*. Low percentages of *Kaṭu* and *Amla Rasa* in these ingredients, protect from the adverse reaction of vitiating the *Pitta Dōṣa* and the *Rakta Dhātu*. Zero presentation of *Lavaṇa Rasa* in all herbal ingredients for Viper Venom was a significant observation that it prevents the hemorrhagic phenomena in both conditions of VBHM and DHF. *Guṇa* of pharmacodynamics properties (*Rasādī Pancaka*) i.e. the *Laghu Guṇa* plays the main role in addressing against reducing digestive fire via its *Langhana* property and counteracts developing *Āma* appears at the onset of “*Jvara*”. *Vīrya* is the potency of the drug by which the drug acts. *Śīta Vīrya* helps to pacify the vitiated *Pitta Dōṣa* and *Rakta Dhātu*. It also helps to reduce *Santhāpa* of *Jvara*. *Kaṭu Vipāka* helps to pacify *Kapha Dōṣa*, to act against *Āma* and to clear *Srōtas Avarōdha* which take place during the course of pathological manifestation of the disease. *Kaṣāya Rasa, Śīta Vīrya* and *Kaṭu Vipāka* possess *Stambhana* action (*Dravyaguna Vijnana, Pandith William Alwis*), which counteract in hemorrhagic condition. Those herbs specially pacify the vitiated *Pitta Dōṣa* and also balance all three *Dōṣa* while maintain the equilibrium of *Dōṣas*.

Therefore, they can act on curing DHF. Because, DHF is a type of *Sannipātaja Jvara*, mainly affecting *Pitta Dōṣa*. Antipyretic (*Jvaraghna*), Pacifying *Rakta* and *Pitta* disorders (*Raktapitta Śāmaka*), Anti hemorrhagic (*Rakta Stambhaka*), Blood purification (*Rakta Śōdhaka*) and Hepatoprotective were main actions in the herbal ingredients used. Those which

are the direct actions which usually is expected to counteract in hemorrhagic condition. Especially the *Raktapitta Śāmaka* and *Rakta Stambhaka* actions help in pacifying hemorrhagic phenomena while *Jvaraghna* action which help to reduce *Jvara*. Pitta is located in the liver (*Yakṛt*), and *Yakṛt* is the root of *Raktavaha Srōtas*. Hence it may lead to occurrence of hepatomegaly in DHF. So Hepatoprotective action of those ingredients may help for that. Dr. Ganesh S. et. al researched some plants to find the therapeutic effects of curing Dengue Fever [11]. Some of them were also found in most frequently used ingredients for Viper Venom (*Polon Viṣa*) mentioned in *Talpatē Piliyam*. They are *Bo (Ficus religiosa)*, *Karalhaba (Achyranthes aspera)*, *Iguru (Zingiber officinale)*, *Madurutala (Ocimum sanctum)* and *Heerassa (Cissus quadrangularis)*. Specially, *Iguru (Zingiber officinale)* is known as *Viśvausadha* means “beneficial for all diseases”, and it possess Blood purification and Antipyretic actions.

According to Ayurveda Pharmacopoeia, fresh juice extracts of *Iguru* is beneficial for *Sannipātaja Jvara*. The rhizome of *Zingiber officinale* plays a significant role in the regulation of plasma leakage in dengue infection and decrease the chances of severe dengue complications according to the research of Sharma B.K. et al. And *Iguru* is beneficial for liver functions. *Bo* is most effective for internal bleeding, because it possess anti hemorrhagic action. *Madurutala (Ocimum sanctum)* possess Antipyretic, Hepatoprotective and Anti-viral actions. *Karalhaba (Achyranthes aspera)* possess *Viṣama Jvaraghna* and Hepatoprotective actions. *Heerassa (Cissus quadrangularis)* possess Anti hemorrhagic and antiviral actions. Therefore, those ingredients are effective in the initial stage of Dengue Fever for preventing hemorrhagic condition and also in DHF. Additionally, *Rathmal (Ixora coccinea)*, *Rukattana (Alstonia scholaris)*, *Ibul (Bombax malabaricum)* and *Penela (Cardiospermum halicacabum)* were mentioned for VBHM according to *Talpatē Piliyam*.

CONCLUSION

Considering the above facts, it can be concluded the most frequently used ingredients in Viper Venom (*Polon Viṣa*) have a possibility to use in Dengue Fever (DF) and Dengue Hemorrhagic Fever (DHF) as it provides facts through the pharmacodynamics study and the specific actions of ingredients. Also it confirmed, according to pharmacodynamic studies among those frequently used ingredients for Viper

Venom *Bo (Ficus religiosa)*, *Karalhaba (Achyranthes aspera)*, *Iguru (Zingiber officinale)*, *Madurutala (Ocimum sanctum)*, *Heerassa (Cissus quadrangularis)* and *Rasakinda (Tinospora cordifolia)* can be used in oral preparation for curing Dengue Fever (DF) and Dengue Hemorrhagic Fever (DHF).

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How to cite this article: Alwis WTN, Kulanatha IGPR. Applicability of internal preparations for viper venom (polon visa) in treating dengue hemorrhagic fever. Indian J Integr Med. 2024; 4(2):31-34.

Funding: None;

Conflicts of Interest: None Stated