THE UTILITY OF SERUM CRP AND LDH LEVELS AS MARKERS OF HEMOTOXICITY IN SNAKE BITE VICTIMS

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LIST OF ABBREVIATIONS

S. CRP	:	Serum C - Reactive Protein
LDH	:	Serum Lactate Dehydrogenase
WBCT	:	Whole Blood Clotting Time
PT	:	Prothrombin Time
APTT	:	Activated Partial Thromboplastin Time
ASV	:	Anti Snake Venom
WHO	:	World Health Organization
ECG	:	Electrocardiography

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INTRODUCTION

In both rural and urban areas, snakebites represent a serious medical emergency and a potential workplace hazard. Envenomation can cause anything from minor local tissue injury to systemic organ failure. A primary cause of mortality among economically productive individuals, it has been labeled a neglected but essential public health concern by the World Health Organization (WHO) in tropical nations.

Despite the widespread availability of anti-snake venom, some snakebite victims still die from their injuries. This is likely due to the fact that those who are bitten by snakes often choose alternative treatments or wait until it is too late to seek medical attention. Anti snake venom (ASV) must be given quickly in order to restore coagulation and other symptoms of envenomation after the venom has been neutralised.

The goal in the treatment of snakebite should be to prevent to prevent the immediate as well as late complications that might arise due to envenomation. In this part of the country hemotoxic envenomation's exceed in number as compared to neurotoxic ones. Novel indicators for the severity of envenomation at presentation might be helpful for both therapy and prognosis.

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NEED FOR STUDY

Snakebites are a serious medical emergency and a regular job danger, and they may happen everywhere from the countryside to the suburbs. Envenomation may cause anything from minor local tissue harm to systemic organ failure. It is the greatest cause of death among economically active people in tropical nations, and the World Health Organization (WHO) has recognised this as a serious public health problem[1]

Despite the widespread availability of anti-snake venom, some snakebite victims still die from their injuries. This is likely due to the fact that those who are bitten by snakes often choose alternative treatments or wait until it is too late to seek medical attention. In order to reverse the effects of envenomation and restore coagulation and other symptoms, anti-venom (ASV) must be administered as soon as possible after exposure.[2]

The goal in the treatment of snakebite should be to prevent the immediate as well as late complications that might arise due to envenomation. In this part of the country hemotoxic envenomation's exceed in number as compared to neurotoxic ones. Novel indicators for envenomation severity at presentation would be useful for both therapy and prognosis, but this is a difficult problem to solve.[3]

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OBJECTIVES OF THE STUDY

To determine the utility of Serum CRP and LDH as markers of hemotoxicity in snakebite victims

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REVIEW OF LITERATURE

Snakes have been considered an object of reverence in India since ancient times. Several temples in India are devoted to deities in the form of snakes. Their ability to cause harm as well as fascinating appearances,have given them a position of awe as well as stature of respect. Many ofus Indians celebrate festivals such as NagarPanchami which are consecrated to snake gods.[1]

The data regarding the incidence of snake bite and their associatedcomplications does not necessarily reflect the true magnitude of theproblem. A good number of snakebite victims' resortto primitive ortraditional methods of treatment which in most cases endangers the life ofvictims [2].Hospitalization with vigilant monitoring to detect the signs of envenomation at the earliest and antivenom therapy will therefore helpreduce the mortality and morbidity associated with venomous snake bite

Moderate leukocytosis, with neutrophilia, lymphopenia, and eosinophilia, Acute phase reactions are characterised by alterations in the blood, namely increases in mucoproteins, clotting time, and C-reactive protein and reductions in total proteins, erythrocyte sedimentation rate, and albumin, all of which are indicative of a response to inflammation and can be mistaken for those caused by venomous snakebites. This data indicates that snake bites are a kind of acute trauma[3]. Possible mechanisms of venom-induced inflammation include the production of inflammatory mediators upon contact with macrophages, mast cells, platelets, polymorphs fibroblasts, endothelial cells, and/or lymphocytes. Bielory et al [4] Equine anti-thymocyte globulin was associated with a subtle elevation of C- reactive protein and erythrocyte sedimentation rate in patients. These changes were first seen on day seven following therapy. In a study done by B. Barravveria et al [3] in Brazil all 4 patients of snake bite studied had an increasing trend in the recorded CRP (c reactive protein) for the first 24 hours after admission. Patients who had been bitten by snakes were classified by Y Xie et al. in China according to a preset scale into three groups: mild, moderate, and severe envenomation[5]. Patients presentingwith severe envenomation recorded statistically significant higher values of SR CRP as compared to mild envenomation group.

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Researchers are actively looking for more sensitive biochemical indicators of systemic envenomation. Some studies have shown that measuring serum LDH activity may help doctors determine the prognosis and treatment plan for patients who have suffered a snake bite. A spike in serum LDH levels, which may continue up to 48 hours, is a good indicator of the hemotoxicity of a snake bite, according to prospective studies conducted on children in Brazil who suffered from mild to severe envenomation. Kandasamy S. et al. [7] found that, at admission and after 24 hours, the S. LDH levels of the snake bite group were considerably greater than those of the control group of 30 patients. The study, which took place in Maharashtra, South India, found that the LDH levels of the envenomed group were considerably greater than those of the control group. [8].

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The data regarding the incidence of snake bite and their associated complications does not necessarily reflect the true magnitude of the problem. A good number of snakebite victims resort to primitive or traditional methods of treatment which in most cases endangers the life of victims [2]. Hospitalization with vigilant monitoring to detect the signs of envenomation at the earliest and antivenom therapy will therefore help reduce the mortality and morbidity associated with venomous snake bites.

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Types of snakes

Atractaspididae, Elapidae, Hydrophiidae, and Viperidae are the four most common snake families. The Elapidae family, which contains the Common cobra, the king cobra, and the krait; the Viperidae family, which includes the Russell's viper, the Pit viper, and the Saw-scaled viper; and the Hydrophiidae family, which includes the water snakes.[1]

The bulk of bites and deaths in India are caused by only five of the country's 70 toxic species: the King Cobra (Ophiophagus Hannah), Common Cobra, and two types of venomous snakes (NajaNaja), Russells viper (DaberiaRuselli), Saw-Scaledviper (EchisCarinatae) and Krait (BungarusCaeruleus).[1]

Elapidae: [3-5]

Teeth in the upper jaw of an elapid begin with a pair of fixed fangs towards the front of the maxilla and are followed by a few smaller teeth. These fangs have a tube for ejecting venom that is deeply grooved. Most of the snakebites in India are caused by the cobras and kraits that are abundant in the country's elapid snake population.[2] The common cobra (Najanaja) also called spectacled cobra is found all over India. It usually measures about one meter but can grow up to 2.2 meters. It is active during day and night; and takes shelter in termite mounds, rat holes and wood piles. The presence of rats as pests near human settlements attracts cobras and this is responsible for the high number of bites seen with this snake. Cobra bites need immediate medical attention as it can cause death within minutes.

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The common krait (Bangaruscaeruleus) is usually identified by the presence of milky white bands on the dorsal body. It is usually active at night and during day time it prefers to stay hidden in dark and cool places like dry mud holes, under debris, pile of stone or bricks. The snake is defensive during day time while offensive at night. They feed on lizards, frogs, rodents and other snakes. They are responsible for most of the bites seen in people who sleep outdoors on floors.

Viperidae: [3]

There are more than 30 different genera and 230 different species of snakes that make up the viperidae, a renowned snake family. The dentition of vipers is unique in having hollow, tubular fangs. These snakes feature two tubular venom transmitting fangs, the largest of which may be as long as five centimetres in length, as well as a number of tiny teeth towards the rear of the upper jaw and along the lower jaw. These fangs can reach speeds of up to 36 kilometres per hour and can be raised in less than a tenth of a second, practically perpendicular to the skull bone.

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Russell’s Viper (Daboiarusselii)[3]

Russell's vipers have stocky bodies and may reach a maximum length of around 1.8 metres at maturity. It is nocturnal like other vipers, which is bad news for people since it hides out in these places during the day. Therefore, it is regularly seen by rural employees when engaged in normal agricultural chores. The first is a set of chain-like or black-edged almond-shaped markings along the length of the snake's back and sides. The second signature is a white triangle on the crown of the head, the tip of which is directed toward the breath passages.

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Saw scaled Viper (Echiscarinatus) [3-4]

The southern Indian Saw-scaled Viper is a relatively short snake, often measuring between 30 and 40 centimetres. Echissochureki, a species native to northern India, may grow to an average length of 60 centimetres. It prefers arid regions to live in. The disturbed posture of this species is one of the most distinctive characteristics of its kind. Putting its head in the middle of its body, it advances into a figure eight formation. Its name, Saw Scaled, comes from the hissing sound made by the fast movement of the snake's coils against each other. Saw Scales often also have patterns like wavy hoops running along both sides of their bodies. Commonly, a white or cream arrow-shaped mark, similar to the form of a bird's foot, is seen on the crown of the head, pointing in the direction of the forehead.

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The Hump-nosed Pit viper (Hypnalehypnale) [4,5]

The Hump-nosed pit viper's total length ranges from 28.5 to 55cm, making it one of the shortest poisonous snakes in India. In addition to the lesser scales seen on all vipers, this one is easily distinguished by the huge, symmetrical plate scales that cover the top of its head. Pits between the nose and the eye are sensitive to heat.

Venom: [7-9]

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Snake venom is a complex mixture of peptides and proteins producing a myriad of biological effects in the envenomed prey. More than 90% of snake venomis constituted by proteins. Compressor muscles protect the venom glands, which reside either behind or below the eye. When a creature bites, a duct containing its venom enters into the fang canal. Venom is expressed by grooved fangs, which are used to deliver fatal quantities of venom into the bodies of their natural prey by contracting compressor muscles. There is no evidence to suggest that the amount of venom injected can be modified to suit the size of the prey or the snake's goals.

The active components of the venom can be divided into either toxins or enzymes -

Toxins:

These are low molecular weight proteins found in elapids Vipers and Hydrophids. They perform pre- or post-synaptic actions at the peripheral neuromuscular junction. Both the release and the binding of acetylcholine to its receptors are inhibited, thereby preventing nerve impulse transmission to muscle especially those associated with breathing. Cobra venom contains postsynaptic neurotoxins such -bungarotoxin and cobratoxin, which bind to the acetylcholine receptor on the motor endplate. Some neurotoxins, including -bungarotoxin, work presynaptically to cause damage, crotoxins are phospholipases A2 which preventrelease of acetylcholine at the neuromuscular junction by blocking voltagegated potassium channels

Enzymes:

Enzymes are proteins too, but their molecular weight is usually higher than 30 kDa. The effect of the enzymes is significantly influenced by its concentration and time of action. Enzymes form the key elements of venoms in viperids. They could beHaemolysins – Haemorrhagic activity is found mainly in viperidae venom andis responsible for spontaneous hemorrhage by damaging vascularendothelium andinhibiting platelet aggregation. Procoagulant Venom factors (Enzymes) act at various points of the clotting cascade while fibrinolyticfactors may act directly or by activating plasminogen Defibrination which results in persistent bleeding from vessels and endothelial damage.

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Proteolytic Enzymes - Catalyze the breakdown of tissue proteins, dissolvecells and tissue at the site of bite causing local pain & Swelling.

Myotoxins – Results in muscle necrosis & myoglobinuria.Hyaluronidases – Facilitates penetration of venom in tissue and its rapidabsorption. It is related to oedema, swelling and rapid absorption of the toxinat the site of bite.Other enzymes include collagenases (digest collagen), phosphoesterases,monoesterases, acetylcholinesterase, ribonucleases, deoxyribonucleases,lactate dehydrogenases,. The roles of these enzymes in human envenoming areuncertain.

Epidemiology[10-12]

Obtaining a precise estimate of snakebite deaths and injuries is difficult since, with the exception of a small number of nations, there is a dearth of good data on these factors. This is due to the fact that patients who seek traditional treatments in countries like India are not accounted for in standard data collection techniques. The World Health Organization (WHO) puts the annual death toll from snakebites anywhere from 35,000 to 50,000, with Asia bearing the brunt of the problem.[10]

In 2008 Kasturiratne estimated that deaths due to snakebite in Asia pacific region alone may be as high as 57,000 per year. In India 18-30% of bites are found to be venomous[6]. The incidence of snakebites is higher during intense agricultural activity and rainy season. This corresponds to movement and activity of snakes.

Majority of snakebites occurring in rural areas and patients dying outside hospital was the conclusion of the study conducted by warren DA et al [12]. These deaths can be reduced by educating the community regarding behavioral changes to reduce the risk of snakebites.[12]

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Clinical manifestations[10, 13, 14]:

Many people think that being bitten by a snake means you will become envenomated. bites from nonvenomous snakes are equally prevalent, though. dry bites occur when the fangs of a poisonous snake penetrate the skin but no envenomation occurs. This might be due to the snake retaining venom out of choice or because the venom mechanism is unable to effectively deliver venom when the strike is made at an abnormal angle. Envenoming is a medical emergency that may quickly become fatal. The clinical features are as follows.

Local symptoms and signs in the bitten part:

Pain at the bite site is the most typical first symptom and often develops within minutes. Within a few hours, it will worsen, move up the trunk, and settle in the lymph nodes around the bite. Within 6 hours after the bite, some patients report experiencing nonspecific stomach or epigastric discomfort. One to four days after a bite, local swelling at the bite site and nearby is at its peak (minutes to 48-72 hrs). The effects of viperbite on local pain and edoema are amplified.

Edema, swelling, and the development of bullae often follow, and may spread swiftly to include the trunk. Typical symptoms of a viper bite include tingling and numbness in the tongue, lips, and scalp, as well as paranesthesia surrounding the lesion. Most bites from this family of snakes result in local bleeding, often manifesting as a petechial and/or purpuric rash. An area of devascularization and necrosis may develop at the site of the bite, making it more susceptible to the development of gangrene. Generally Wet gangrene develops quickly after an elapid bite, but dry gangrene develops rapidly after a viper bite due to the direct cytotoxic impact of the venom.

Systemic symptoms and signs:

- General-Nausea, vomiting, malaise, abdominal pain, weakness,drowsiness,prostration.
- Cardiovascular-Dizziness, faintness, shock, hypotension, cardiacarrhythmias,pulmonary edema.
- Bleeding and clotting disorders: Traumatic bleeding from recent wounds orprolonged bleeding from the fang marks and from oldpartly-healed wounds
- Spontaneous systemic bleeding: From gums, epistaxis, intracranial haemorrhage, haemoptysis, haematemesis, rectal bleeding or melaena, haematuria, vaginalbleeding, ante-partum haemorrhage in pregnant women, bleeding into the mucosa and skin (petechiae, purpuraand ecchymoses) and retina.

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- Neurological :Drowsiness, paresthesia, problems with taste and smell perception, nasal regurgitation and swallowing, facial paralysis and other cranial nerve-related symptoms, ptosis, and external ophthalmoplegia. Limb weakness and loss of deep tendon reflexes may follow. The hallmark of paralysis seen in elapid bites is a progressive and descending paralysis. Diaphragm and intercostal muscular paralysis results in death unless the patient is properly ventilated.

Krait bite generates relatively limited local response and is also linked with delayed start and protracted time of complete paralysis, However, the clinical manifestations of neurotoxic envenoming by either the cobra or the krait are similar, with both species capable of inducing respiratory failure within 30 minutes. This prolonged period of paralysis is related to its powerful presynaptic toxins like beta-bungarotoxins that destroy nerve terminals.[15]

- Renal: Loinpain, haematuria, haemoglobinuria,myoglobinuria, oliguria/anuria, uraemia.
- Endocrine: Adrenal and pituitary failure due to an acute infarction, often associated with a Russell's viper bite.

Late onset envenomation:

Species like hump nosed pit viper and Krait are known for delayed envenomation. It can take 6-12 hours for the symptoms and signs to manifest.[16] Hence it is necessary to keep a patient under observation for at least 24 hours when there areno obvious signs of envenomation in the initial hours.[17]Death from snakebite can occur as rapidly as within minutes in case of elapid bites and can be delayed for several days in viperine bites. Local swelling at bite site occurs immediately within 2-
4 hours while its resolution can sometimes take months especially in the elderly.

Deaths occurring from neurotoxic envenoming are caused by airway obstruction or respiratory paralysis. Acute renal damage is often to blame for fatalities that occur beyond the first 5-day period after the bite. Risk factors for poor outcome include capillary leak syndrome, respiratory paralysis and intracerebral hemorrhage.[18]

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Grading of severity of envenomation:

The following scale was used to grade the severity of envenomation.[19]

No envenomation:	
Local manifestations	Mild pain
Systemic manifestations	None
Laboratory findings	None
Mild envenomation	
Local manifestation	Swelling, erythema or echymosis confined to the site ob bite
Systemic manifestations	None
Laboratory findings	None
Moderate envenomation	
Local manifestation	Progression of swelling, erythema or ecchymosis beyond thesite of bite
Systemic manifestations	Non life threatening signs and symptoms. Perioral and peripheral paresthesia, nausea, vomiting, diarrhea, ptosis, diplopia.
Laboratory findings	Mildly abnormal coagulation profile with no features ofsystemic bleeding. Mildly abnormal other laboratory tests.
Severe envenomation	
Local manifestation	Rapid swelling, erythema echymosis involving the entire part or body
Systemic manifestation	Hypotension, tachycardia, tachypnoea respiratory paralysis, seizures, fasciculation, altered mental status
Laboratory findings	Systemic bleeding or markedly abnormal coagulation profile, unmeasurable INR, APTT and platelet count <20,000

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Chronic sequelae[20]

Tissue loss, amputations, contractures, hypertrophic and keloid scars, complications of surgery are amongst the most common sequelae of snakebite. They can also develop chronic ulceration, osteomyelitis or arthrodesis. Malignant transformation can occur in skin ulcers after a number of years. Patients can develop bilateral cortical necrosis and go into chronic kidney disease requiring regular hemodialysis. Intracerebral hemorrhage can result in neurologic deficits and occasionally pituitary hemorrhage can lead to Sheehan syndrome.

First-aid[10, 21, 22]

Reassure the victim Any movement or muscle contraction of the bitten limb promotes absorption of venom into the blood stream and lymphatics, thus the limb should be immobilized with a splint or sling. Do not touch the bitten area, as this increases the risk of infection, more venom absorption, and further local bleeding if you do things like rubbing, aggressive cleaning and massage, or applying herbs or chemicals. By applying a pressure of roughly 55 mm Hg, lengthy elastic bandages may compress the superficial veins and lymphatic's throughout the whole bitten limb.

Investigations:

- 20-minute whole blood clotting test (20WBCT)

This test requires very little skill and only one piece of apparatus – a new,clean and dry glass vessel

Place 2 ml of freshly sampled venous blood in a small, new or heat cleaneddry, glass vessel.

Leave undisturbed for 20 minutes at ambient temperature.Tip the vessel once.

If the blood is still liquid and runs out, the patient has hypo fibrinogen aemia (incoagulable blood) as a result of venom-induced consumption coagulopathy.

Incoagulable blood suggests a plasma fibrinogen concentration of less than 0.5g/L.[22]

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- Platelet count: This may be decreased in victims of envenoming by vipers.
- White blood cell count: An early neutrophilic leukocytosis is evidence of systemicenvenoming from any species.
- Blood film: Fragmented red cells are seen when there is microangiopathichaemolysis.

Biochemical abnormalities:[21, 22, 23]

- Aminotransferases and creatinekin as will be elevated if there is muscle damageeither local or generalized.
- Bilirubin is elevated following massive extravasation of blood.
- Potassium, creatinine, urea levels are raised in the renal failure
- Arterial blood gases and pH may show evidence of respiratory failure (neurotoxicenvenoming) and acidaemia (respiratory or metabolicacidosis).
- Electrocardiographic abnormalities include ST-T changes, AV block andarrhythmias.

S. CRP as a marker of haemotoxicity in snake Bite: [24-26]

A moderate leukocytosis, neutrophilia, lymphopenia, and eosinophilia, together with elevated mucoproteins, a prolonged clotting time, and elevated C-reactive protein, and decreased total proteins, erythrocyte sedimentation rate, and albumin, are all features of the blood picture of an acute-phase reaction that can be caused by a venomous snake bite. Evidence like this suggests that snake bites are a kind of acute trauma[24].

It is probable that the inflammatory mediators are released from the target cells when components of the snake venom contact with them (macrophages, mast cells, platelets, polymorphs fibroblasts, endothelial cells, and/or lymphocytes). Bielory et al [25] patients who were given equine anti-thymocyte globulin saw their C-reactive protein and erythrocyte sedimentation rate rise somewhat. Changes of this kind were detected as early as the seventh day after therapy. In a study done by B. Barravveria et al [24] in Brazil all 4 patients of snake bite studied had an increasing trend in the recorded CRP(c reactive protein) for the first 24 hours after admission. Patients who had been bitten by snakes were classified by Y Xie et al. in China according to a preset scale into three groups: mild, moderate, and severe envenomation[26]. Patients presenting with severe envenomation recorded statistically significant higher values of S CRP as compared to mild envenomation group.

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S. LDH as a marker of hemotoxicity in snake bite: [27-29]

There is current and active research on the development of more sensitive biochemical indicators for systemic envenomation. Serum LDH activity may be helpful in the diagnosis and prognosis of snake bite patients, as has been shown by previous study. Children who had suffered moderate to severe snake bite envenomation had an early increase in blood LDH levels, which associated well with the degree of hemotoxicity of the snake bite, according to a prospective research conducted in Brazil[27].

In a study done by Kandasamy S. et al [28] S. LDH levels were significantly higher in the snake bite group at admission and after 24 hours compared to the control group of 30 patients. In a study done in Maharashtra, South India, participants who were envenomed had considerably greater LDH levels compared to the control group[29].

Anti Snake Venom(ASV)

Pure immunoglobulin extracted from the blood plasma of an animal that has been inoculated against snake venom is known as antivenom. Antivenom is typically made from the plasma of an equine or ovine animal. In the 1890s, Albert Calmette presented it for the first time at the Institute Pasteur in Saigon. It is available in India since the past 60 years.[15]It can be monovalent or polyvalent. Monovalent ASV is active against venom of one particular species while polyvalent ASV acts against several species. It works in situations of hemostatic problems lasting two weeks or more, even after several days of systemic envenoming. As long as coagulopathy symptoms remain, it is permissible to continue antivenin treatment; nonetheless, early administration of ASV is of utmost importance.

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Polyvalent antivenom takes into account the four principal snake species (N. naja, B.caeruleus, D. russelii, and E. carinatus) responsible for the majority of fatalities. It has been shown that 1 millilitre of polyvalent ASV is capable of neutralising 0.6 milligrammes of cobra venom, 0.45 milligrammes of krait venom, 0.60 milligrammes of Russell's viper venom, and 0.60 milligrammes of saw-scaled viper venom[20]. Unfortunately, a number of the species that cause the most harm and death in the region have been overlooked, and this antivenom is often ineffective against their venom. Subcutaneous administration of lyophilized (frozen) multivalent adeno-associated virus (AAV) is administered over 30-60 minutes. The reconstituted virus is diluted with 5 ml/kg body weight of normal saline.

If the snake's identification can be established, the best therapy is monovalent anti-venom, which requires a smaller quantity of anti-venom protein but is still effective. Polyvalent anti-venom is still the primary therapy for snakebites in India due to its availability, efficacy, and low cost.[30, 31]

The most important determinant of outcome in snakebites is the timing of administration of ASV.[30] However, the antigenic characteristics and content of the venom may change among locations, which might affect the success of the therapy. Because of this, anti-snake venom may or may not be effective. Since the venom used to make Indian ASV is collected only from a specific region in Tamil Nadu, it may not be as potent in other parts of the country or the world.[2]

Indications for antivenom[31]

Coagulopathy evidenced by spontaneous systemic bleeding or prolonged20WBCT, prothrombin time or thrombocytopenia (<1,00,000/mm^3)

- Acute renal failure
- Neurotoxic signs
- Cardiovascular abnormalities: hypotension, shock, arrhythmias
- Local envenomation:

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- Swelling involving more than half of bitten limb or rapid extension of swelling

- Presence of enlarged tender lymph nodes in the draining area.

Supportive treatment

When both the vocal cords and the muscles of breathing are paralysed, the patient is at risk for aspiration, airway blockage, respiratory failure, and ultimately death. An endotracheal tube with a cuff or a laryngeal mask airway must be used as soon as secretions build up or breathing becomes difficult. Potential need for mechanical ventilation.

Anticholinesterases are administered if a patient has neurotoxic envenomation.

In cases of hypotension or shock, doctors may prescribe inotropes or vasoconstrictors to restore blood pressure to a normal range.

Acute Kidney Injury (AKI) may necessitate hemodialysis

In the event that necrosis develops at the site of the bite, prompt surgical debridement, skin grafting, and wide spectrum antibiotic coverage are essential.

Antibiotic prophylaxis is not necessary unless there is an open wound that poses a risk of infection.

However, compartment syndrome with intra-compartmental pressure more than 45mm Hg, which would indicate a danger of ischemia necrosis, is unusual in cases with snakebite-related pain, tight swelling, coldness, and cyanosis. Therefore, fasciotomies should be avoided if at all possible, and are contraindicated until enough antivenin therapy and coagulation factors have been administered.

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ASV reactions[10, 32]

Around 10% of patients may develop reaction to antisnake venom. The risk ofreactions depends on dose administered and the speed of administration.

Early reaction:

It develops 10-180 minutes after starting antisnake venom. As an alternative to IgE-mediated type 1 hypersensitivity, immunological complexes or IgG aggregates are considered as the activators of the complement system. Symptoms include a dry hacking cough, gastrointestinal distress, a rash, vomiting, stomach pain, and a rapid heart rate. Patient should receive 0.5 mg of epinephrine intramuscularly into the upper lateral thigh at the first indication of an early response. If the patient's condition is not improving, the dose may be given again after 5-10 minutes. the subsequent epinephrine, patients are given a dose of antihistamine like chlorpheniramine maleate followed by intravenous hydrocortisone 100mg.

Pyrogen reactions:

It develops one or two hours after starting ASV. Patient develops rigors, fever and hypotension as a result of vasodilation. The introduction of pyrogens during production is to blame for these reactions. In order to counteract the patient's immediate response, epinephrine is administered. Antipyretics and external cooling are used in conjunction to bring down the patient's temperature. Treatment for hypotension involves administering fluids intravenously.

Late reactions:

It develops 1-12 days after treatment with ASV. Patients present with fever, vomiting, diarrhea, itching, lymphadenopathy, mononeuritis multiplex. Patients should be treated with five day course of oral antihistamines. If they fail to respond, they may be treated with oral prednisolone.

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Control and prevention[15]

- The burden of snakebites is particularly severe in South Asian nations, however there are very little efforts made to reduce the region's snake population or safeguard its inhabitants against bites. There are a few straightforward measures one may take to lessen the likelihood of a snakebite and the ensuing medical complications.
- Preventing nighttime bites, particularly from krait, may be accomplished by sleeping on a cot rather than the floor and by utilizing bed nets.
- Remove any garbage, termite mounds, and firewood from around homes.
- Snakes love to take refuge in shady areas, thus it is important to routinely inspect your mud and straw walls, as well as your thatched roof.
- Using proper footwear like boots during agricultural activity.

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MATERIALS AND METHODS

Source of data:

Patients who had been bitten by a snake and were treated at shri B. M. Patil Medical college, hospital & research Centre in Vijayapura, Karnataka, provided the data.

Method of collection of data:

Study Design:

Prospective study.

Sample Size:

Purposive sampling was used to choose a sample of fifty participants for the research based on predetermined inclusion and exclusion criteria.

The victim's pulse, respiration rate, blood pressure, and peripheral oxygen saturation (SpO2) were taken and the location of the bite noted upon arrival.

The following diagnostic procedures were performed on patients who presented with a history indicative of snakebite. Again, the following tests were run twice, once immediately following confirmation and again after 24 hours: hemoglobin, complete blood count, differential cell count, standard and tiny pee examination, serum C-receptor protein and lactate dehydrogenase, activated partial thromboplastin time, prothrombin time with a global standardized proportion, erythrocyte sedimentation rate, platelet count, stuffed cell volume, fringe smear, and total blood count.

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Patients underwent a repeated 6-hourly trial of their draining time, thickening time, and a 20-minute whole blood coagulating test in the first 24 hours after admission to the clinic.

Patients with a history of snakebites who show no symptoms, evidence of local or systemic envenomation, or laboratory abnormalities within 24 hours after perception are said to have had dry chomps.

Thereafter, patients were categorized into groups according to whether they had been unenvenomated, mildly envenomated, moderately envenomated, or severely envenomated. Serum levels of LDH and C-reactive protein were also measured, and a link was made with the aforementioned findings.

Inclusion Criteria:

- Patients with alleged history of snakebite.
- Patients with a history of unknown bite but with symptoms and signs compatiblewith snake bite envenomation
-

Exclusion Criteria:

Any non-snake bite instance that has come to light. Those who have a history of bleeding issues. Individuals who were pre-administered ASV before to hospitalization. Vasculitis-affected patient.
Person having a past medical history of liver illness, either acute or chronic The patient has a previous history of cancer.
Myocardial infarction patient with a history of recurrent attacks

Data Analysis:

Frequency, percentage, mean, standard deviation, and Karl-coefficient Pearson's of correlation were used to examine the data.

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RESULTS

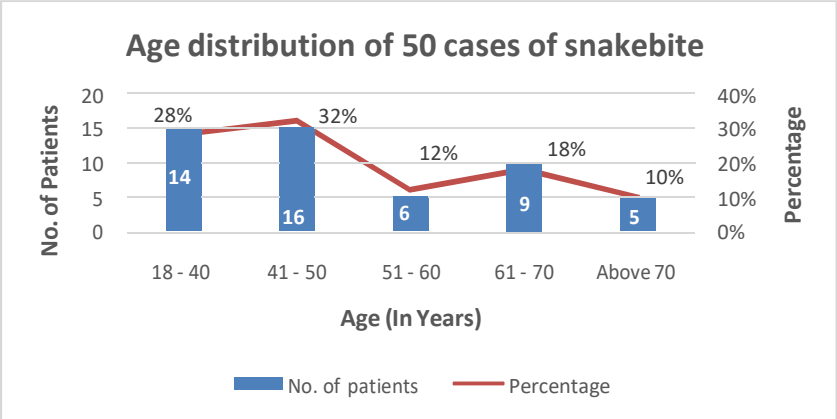
This study was done in patients admitted to SHRI B. M. PATIL MEDICAL COLLEGE, HOSPITAL & RESEARCH CENTRE VIJAYAPURA, KARNATAKA.

Fifty patients who had been brought to our hospital with a history of snakebite or indications of envenomation were evaluated and monitored for the first 24 hours. Below, you can find information in the form of patient profiles and results from various examinations.

1. Age distribution

Table 1: Age distribution of 50 cases of snakebite

Age (in years)	No. of patients	Percentage
18 - 40	14	28%
41 - 50	16	32%
51 - 60	6	12%
61 - 70	9	18%
Above 70	5	10%
Total	**50**	



Graph 1: Age distribution

In In our sample, participants' ages ranged from 18 to 72. Patients younger than 50 made up the majority of our practice's demographic. The average patient's age was 41 and a half.

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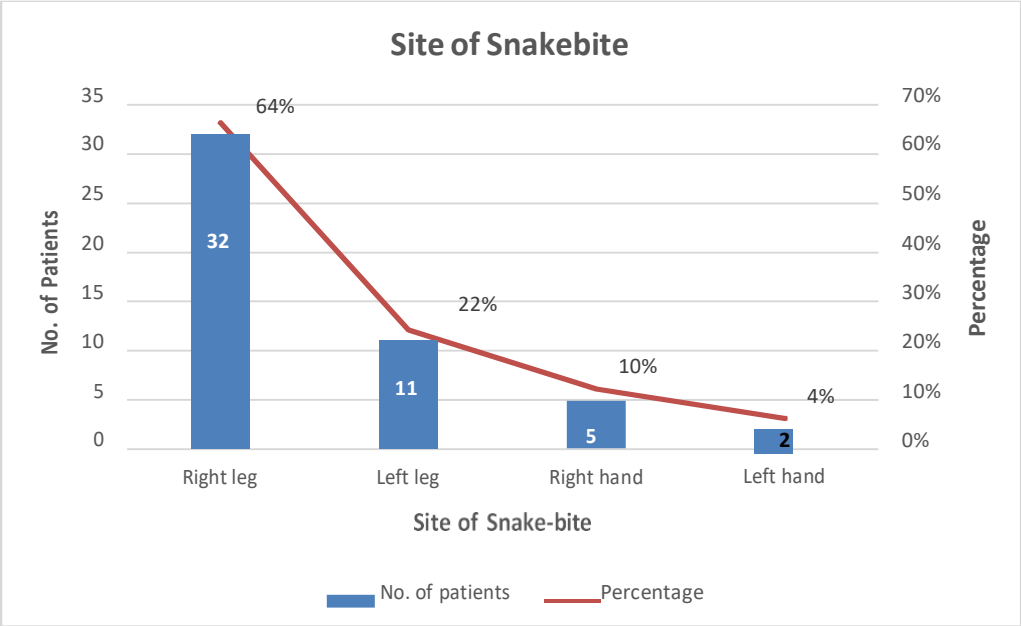
2. Site of snakebite

Table 2: Site of snakebite

Site	No. of patients	Percentage
Right leg	32	64%
Left leg	11	52%
Right hand	5	10%
Left hand	2	4%
Total	**50**	



Graph 2: Site of snakebite

Within our sample, bites occurred more often in the lower extremities. Of the 50 people that were bitten, 43 (84% of the total) had their lower extremities bitten, whereas 7 (16%) had their upper extremities bitten.

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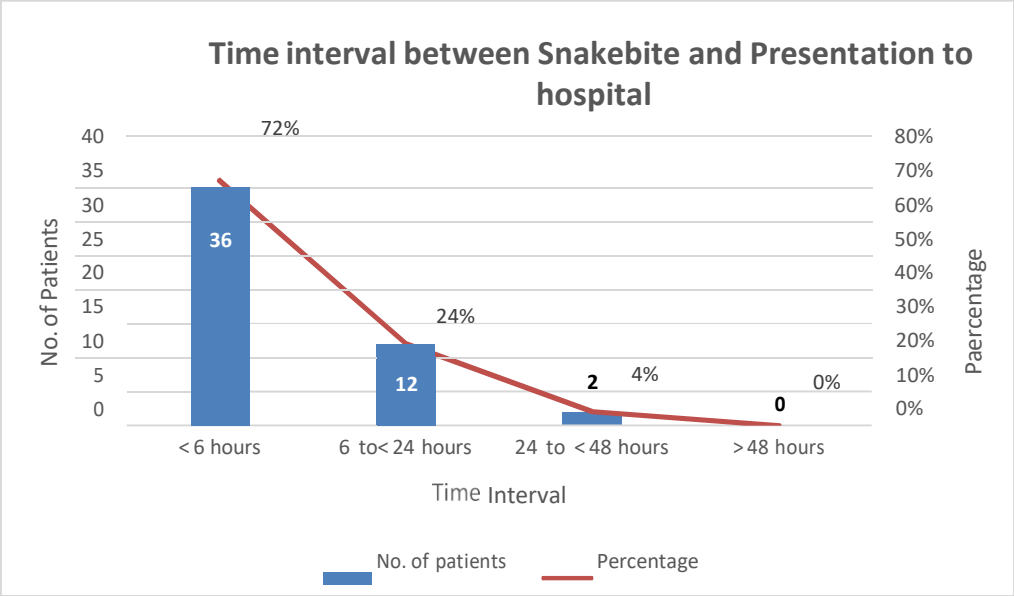
3. Time interval between snakebite and presentation to hospital

Table 3: Time interval between snakebite and presentation to hospital

Time interval	No. of patients	Percentage
< 6 hours	36	72%
6 to 24 hours	12	24%
24 to 48 hours	2	4%
≥ 48 hours	0	0%
Total	**50**	



Graph 3: Time interval between snakebite and presentation to hospital

Among the patients analyzed in this research, 36 (72%) presented within 6 hours and 14 (24%) appeared within 24 hours following the bite.

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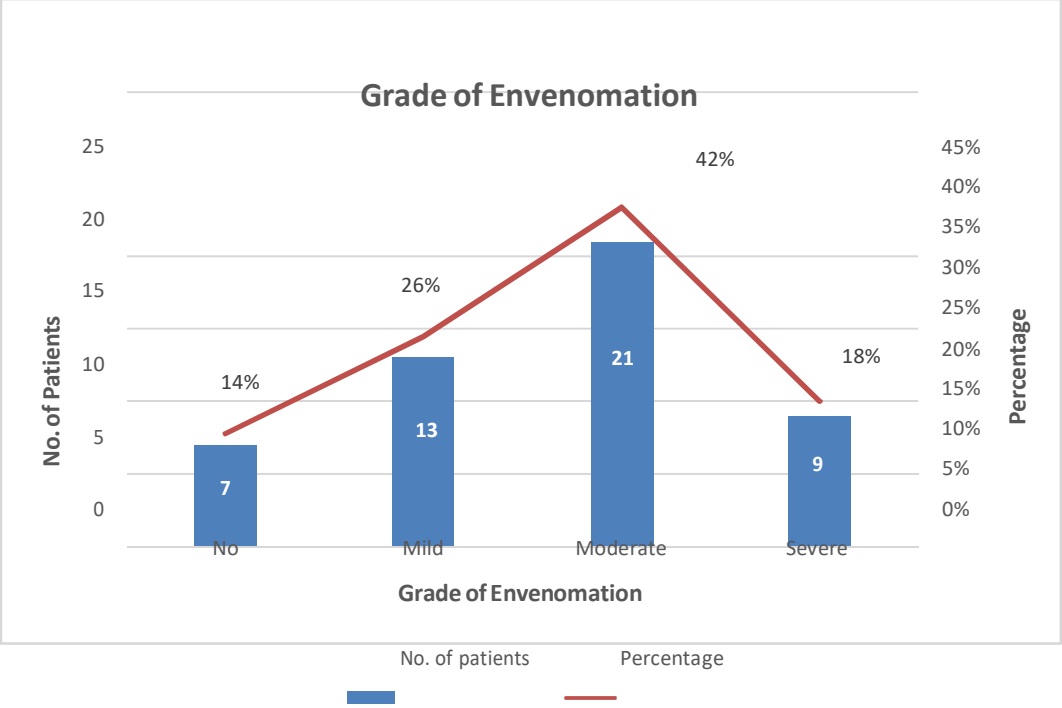
4. Grade of Envenomation

Table 4: Grade of Envenomation

Grade of Envenomation	No. of patients	Percentage
No	7	16%
Mild	13	24%
Moderate	21	42%
Severe	9	18%
Total	**50**	



Graph 4: Grade of Envenomation

According to the results of this research, the majority of snakebite patients in the United States have symptoms consistent with mild envenomation. Twenty-one participants (42%) showed signs of mild envenomation, nine individuals (18%) showed signs of severe envenomation, thirteen individuals (26%) showed signs of light envenomation, and seven individuals (14%) showed no signs of envenomation.

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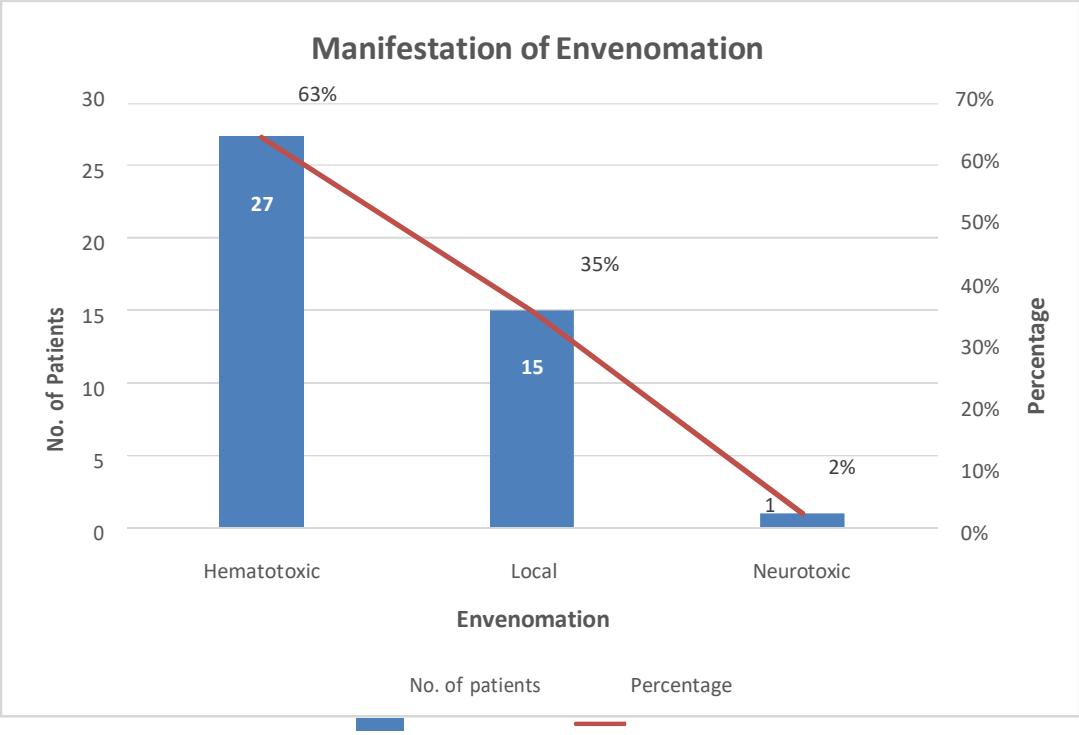
5. Manifestation of Envenomation

Table 5: Manifestation of Envenomation

Manifestation of Envenomation	No. of patients	Percentage
Hematotoxic	29	67.4%
Local envenomation	13	30.23%
Neurotoxic	1	2.32%
	43	



Graph 5: Manifestation of Envenomation

Within our research population, 29 individuals (67% of the total) had symptoms consistent with Hemotoxic envenomation.

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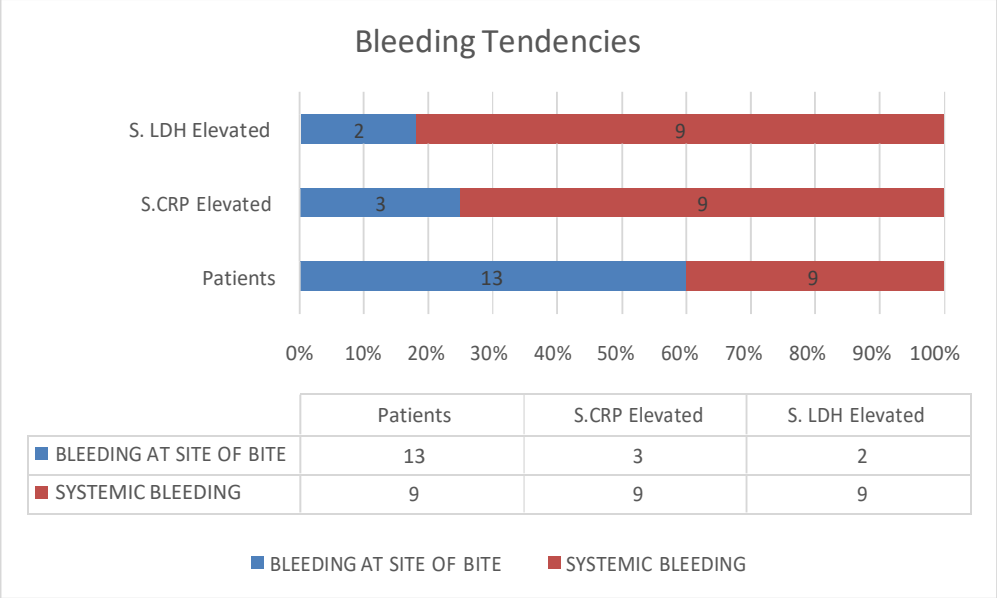
6. Envenomation and Correlation with S.CRP and LDH

Table 6: Envenomation and Correlation with CRP and LDH

SYMPTOMS	NUMBER	%	S.CRP Elevated	%	S. LDH elevated	%%
Local envenomation	13	26	3	23.07	2	15.38
Systemic bleeding	9	18	9	100	9	100



Graph 6: Envenomation and Correlation with CRP and LDH

Thirteen (26% of the total) individuals in our research group had symptoms consistent with local envenomation, whereas nine (18%) showed symptoms of systemic haemorrhage.

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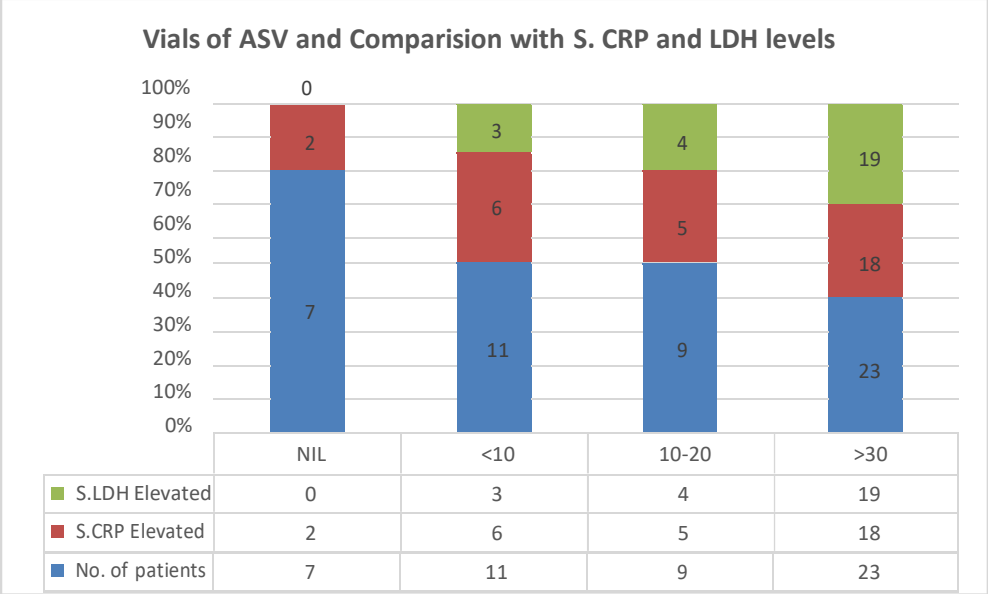
7. Polyvalent ASV used and its comparison with S. CRP and LDH levels

Table 7: Polyvalent ASV used and its comparison with S. CRP and LDH levels

Number of vials of ASV	No. of patients	%	CRP Elevated	%	LDH Elevated	%
NIL	7	14	2	28.57	0	0
<10	11	22	6	54.54	3	27.27
10-20	9	18	5	55.55	4	44.44
>30	23	46	18	78.26	19	82.60
	50					



Graph 7: Polyvalent ASV used and its comparison with S. CRP and LDH

Within our study population, 23 patients (46% of the total) received 30 or more vials of polyvalent ASV, 9 patients (18%) received 10-20 vials, and 11 patients (22%) received less than 10 vials.

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8. Haematological Parameters in envenomed patients

Table 8: Haematological parameters in envenomed patients

Haematological parameters	No. of Patients	%
Haemoglobin(in grms) < 10	8	13.95
Total count >11,000	16	37.20
Platelet count <100,000	8	18.60
Prothrombin Time (in secs) >15 sec	11	25.58
Activated Partial Thromboplastin Time (in secs) >30 secs	13	30.23
WBCT >20 minutes	27	62.79
INR >1.5	12	27.90
	43	

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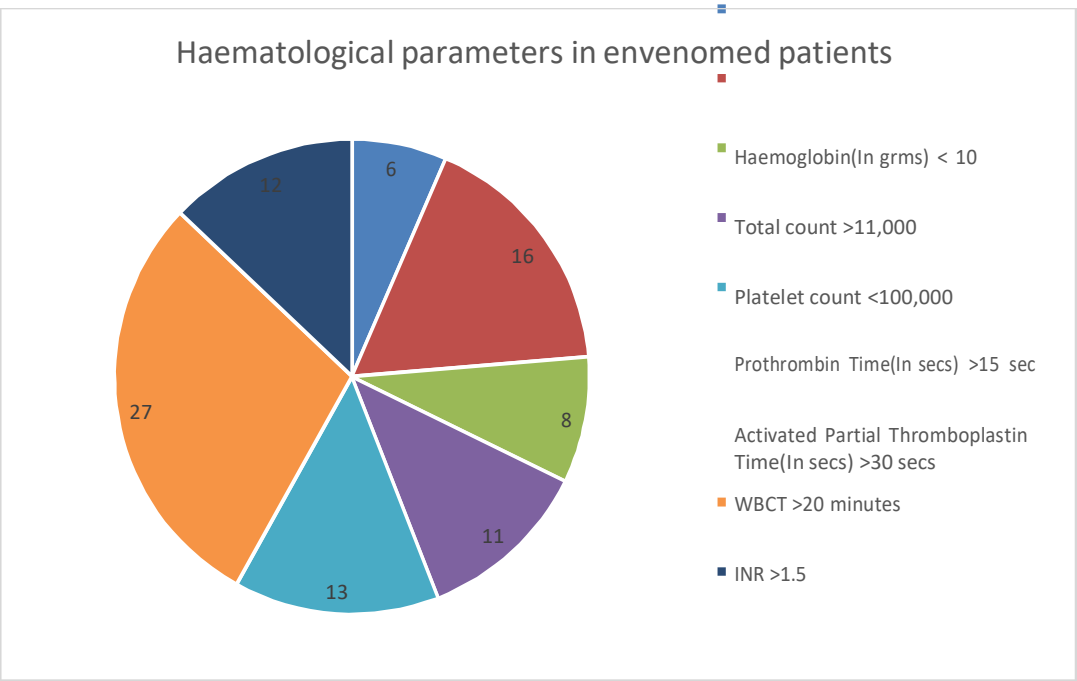

Graph 8: Haematological parameters in envenomed patients

Among the individuals we studied, 27 (62.79%) showed signs of envenomation and had an increased WBCT, whereas only 8 (13.95%) had haemoglobin levels below 10.

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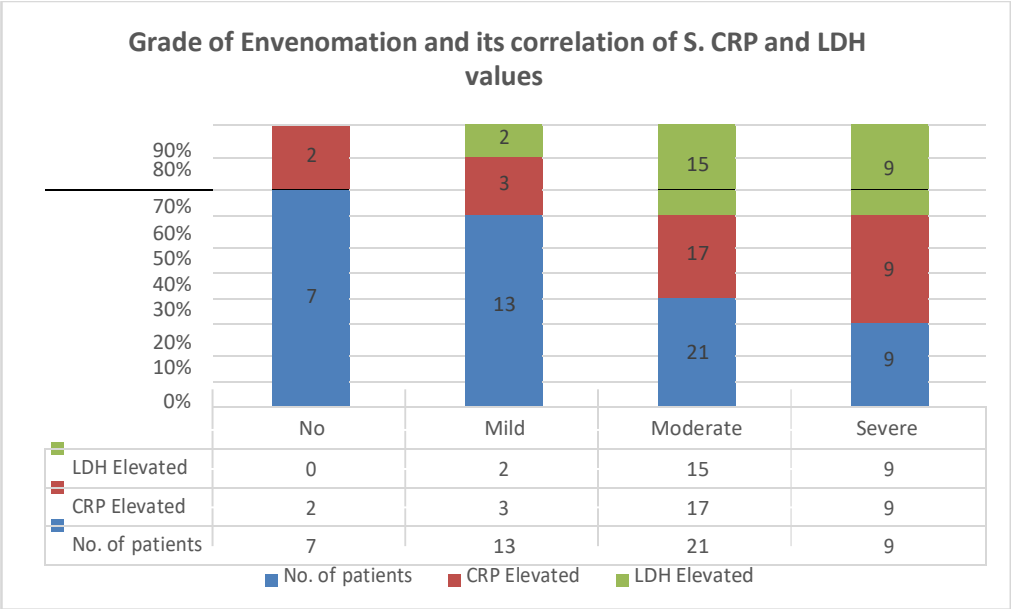
9. Grade of Envenomation and comparison with Serum CRP and LDH values

Table 9: Grade of Envenomation and its correlation of S. CRP and LDH values

Grade of Envenomation	No. of patients	Percentage	CRP Elevated	Percentage	LDH Elevated	Percentage
No	7	16%	2	28.57%	0	0%
Mild	13	24 %	3	23.07%	2	15.38%
Moderate	21	42 %	17	80.95%	15	71.42%
Severe	9	18 %	9	100%	9	100%
Total	**50**					



Graph 9: Grade of Envenomation and its correlation of S. CRP and LDH values

In our investigation, elevated levels of S. CRP and LDH were found in all 9 individuals with severe envenomation, but only 17 (80%) and 15 (71.42%) of those with mild envenomation, respectively.showed elevation in their values at presentation.

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Statistical comparison with other studies:

Table 1: Comparison of mean age among different studies

Suchithra N, et al.[33]	Monteiro FN ,et al.[34]	Sharma SK, etal.[35]	This study
40	40.7	32	41.4

Table 2: Comparison of Manifestation of envenomation among different studies

Manifestation	Kulkarni ML, et al.[36]	Suchithra N, et al. [33]	This study
Coagulopathy	58.6%	71%	**67.4%**
Neurotoxicity	12.5%	3%	**2.32%**

Table 3: Comparison of Local Envenomation and Systemic bleeding among different studies

Bleeding Manifestations	Harshavardhana HS, et al.[39]	This study
Local envenomation	40%	**24%**
Systemic bleeding	50%	**18%**

Table 4: Comparison of Dosage of Polyvalent ASV among various studies

Vials of ASV	Pore SM, et al.[40]	Harshavardhana HS, et al.[39]	This Study
<10	49%	22%	25%
10-20	41%	26%	21%
>30	10%	52%	54%

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Table 5: Comparison of Hematological parameters among various studies

Hematological Parameters	Harshavardhana HS, et al.[39] (%)	This Study(%)
\ Hemoglobin (in grms) < 10	26	14
Total count >11,000	64	38
Platelet count <100,000	48	19
Prothrombin Time (in secs) >15 sec	56	26
Activated Partial Thromboplastin Time (in secs) >30 secs	62	30
WBCT >20 minutes	60	63

Table 6: Comparison of S. LDH values in snakebite Patients among various studies

S. LDH (In envenomed group)	Bhagwat K, et al.[29]	Kandaswamy S, et al.[28]	This Study
At Presentation	425±306	225.8±31.33	299.10±64.97
Day 1	391.26±281.23	-	333.86±72.94
p Value	<0.05	<0.01	<0.05

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Table 7: Grades of envenomation and its comparison with S.CRP values

S. CRP	Xie Y, et al.[2]	This Study
Mild	7.78±1.62	**9.96±2.86**
Moderate	19.46±13.74	**23.42±16.42**
Severe	39.29±19.27	**23.61±15.54**
p Value	0.01	**0.01**

Table 8: Grades of envenomation and its comparison to S. CRP and LDH in our study group

ENVENOMATION	S. CRP AT PRESENTATION	S. CRP AT 24 HOURS	S. LDH AT PRESENTATION	S. LDH AT 24 HOURS
NO	3.12±2.78	3.78±2.94	147.28±8.78	174.47±20.49
MILD	9.96±2.86	14.26±5.46	207±7.07	267±7.01
MODERATE	23.42±16.42	31.27±20.30	290.10±40.19	322.28±51.79
SEVERE	23.61±15.54	31.18±21.50	334.57±81.58	368.03±96.15
p value	0.01	0.01	0.02	0.02

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DISCUSSION

Haemotoxic envenomation and related consequences are the most common outcomes for snakebite victims in this region. The function of serum LDH as a measure of haemolysis and CRP as a sign of acute inflammatory response has been shown in a small number of investigations, there have been no significant studies done showing a correlation between haemotoxicity and serum CRP or LDH in snakebite victims. Hence in this study we aimed to analyze the relationship between serum CRP, LDH with haematological profile, and to ascertain their utility as markers of haemotoxicity in snakebite victims.

Current study, hospital & research centre Vijayapura, Karnataka, includes 50 persons hospitalized at shri B. M. Patil medical college. had a record of having been bitten by a snake.

- **Age distribution**

Table 10: Comparison of mean age among different studies

Suchithra N, et al.[33]	Monteiro FN ,et al.[34]	Sharma SK, etal.[35]	Thisstudy
40	40.7	32	41.4

Snakebites were found to be more common among adults in this research. The median age of our patients was just 41.4, and 60% of them were less than 50. This correlated with other studies done by Suchithra N, et al.[33], Monteiro FN, et al.[34] and Sharma SK, et al.[35] where the average age was 40, 40.7, and 32 years. Most of the people who have this disease are of working age, thus it may be quite expensive for their families.

- **Sex distribution**

In the current investigation, men were shown to have a greater rate of snakebite than females did (2.12 to 1). Males may be more at risk for snakebite since they spend more time outside than females do. This matched the findings of investigations such as the one by Monteiro FN, et al. [34] where the ratio was 1.38:1 and by Kulkarni ML, et al.[36] where the ratio was 2.17:1.

- **Site of Snakebite**

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Our research found that snakebites most often occurred on the lower extremities. The number of bites on lower limbs was six times that on higher limbs. Based on the results of a research by SaravuK,et al.[37] showed a ratio of 3.48:1. Another study done by David S, et al.[38] demonstrated a 3.44-fold increase in the incidence of bites to the lower extremities compared to the upper extremities. Because most of these incidences occur in the open, either at night on unintended stepping or when working in the fields, bites to the lower extremities are more prevalent than those to the upper ones.

- **Manifestation of envenomation**

Table 11: Comparision of Manifestation of envenomation among differentstudies

Manifestation	Kulkarni ML, et al.[36]	Suchithra N, et al. [33]	This study
Coagulopathy	58.6%	71%	**67.4%**
Neurotoxicity	12.5%	3%	**2.32%**

In the present study hemotoxic envenomation with coagulopathy was higher in occurrence compared to neurotoxic envenomation. A Study done by Kulkarni ML, et al.[36]at Devanagari showed a similar result with 58.6%patients developing

coagulopathy after snakebite. A study done by Suchithra N, et al. [33] in Kerala showed 71% of patients demonstrating coagulopathy after snakebite. There are more viperidae than elapids in this area, which may explain why this is the case.

- **Local vs. Systemic bleeding**

Table 12: Comparison of Local Envenomation and Systemic bleeding amongdifferent studies

Bleeding Manifestations	vardhana HS,et al.[39]	This study
Local envenomation	40%	**24%**
Systemic bleeding	50%	**18%**

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Recent research has shown that our study population had a lower risk of both local envenomation's and excessive bruising and bleeding as a whole. The rate of systemic bleeding symptoms was found to be 50% in research conducted in Bangalore by Harshavardhana HS, et al.39, whereas the incidence of local envenomation was found to be 40%. This might be because their study population presents to the hospital later than average and/or has a greater rate of bites from viperidae. Our research showed that all 9 individuals who presented with systemic bleeding also had high levels of S.CRP and LDH.

- **Dosage of Polyvalent ASV**

Table 13: Comparison of Dosage of Polyvalent ASV among various studies

Vials of ASV	Pore SM, et al.[40]	vardhana HS,et al.[39]	This Study
<10	49%	22%	25%
10-20	41%	26%	21%
>30	10%	52%	54%

Most of the patients in our research group were given more than 30 vials of ASV throughout their hospital stay. According to research conducted in the Indian state of Maharashtra by Pore SM, et al.[40] Forty-nine percent of patients received less than 10 vials of ASV, 41 percent received between 10 and 30, and 10 percent received more than 30 vials. According to research by Harshavardhana Sur in Bangalore HS, et al.[39] Patients who received more than 30 vials of ASV saw a rise of 52 percent. The larger number of patients in our research who were identified as having systemic envenomation may explain the higher mean ASV dose. Importantly, the use of ASV varied widely amongst the 3 trials and was ultimately left up to the discretion of individual physicians. At admission, we found that patients who needed more than 30 vials of Polyvalent ASV were more likely to have high S CRP (78.26%) and LDH (82.20%) levels than those who needed fewer vials.

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- **Haematological parameters in patients with coagulopathy**

Table 14: Comparison of Haematological parameters among various studies

Hematological Parameters	Harshavardhana HS, et al.[39] (%)	This Study(%)
\ Haemoglobin (in grms) < 10	26	14
Total count >11,000	64	38
Platelet count <100,000	48	19
Prothrombin Time (in secs) >15 sec	56	26
Activated Partial Thromboplastin Time (in secs) >30 secs	62	30
WBCT >20 minutes	60	63

WBCT prolongation was seen in 63% of envenomation patients, whereas PT and INR prolongation were observed in 26% and 28%, respectively. Based on research conducted in Bangalore by Harshavardhana HS etal[39] [60]%, The WBCT PT and INR were both prolonged, respectively (56%) and (48%). Possible explanations for this discrepancy include a larger proportion of patients in their research group experiencing systemic envenomation, and a shorter time between first symptoms and hospital admission in our study group.

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- **Snake Bite Envenomation and comparison with Serum CRP and LDH values**

Table 15: Comparison of S. LDH values in snakebite Patients among variousstudies

S. LDH (In envenomed group)	Bhagwat K, et al.[29]	swamy S, etal.[28]	This Study
At Presentation	425□306	225.8□31.33	299.10□64.97
Day 1	391.26□281.23	-	333.86□72.94
p Value	<0.05	<0.01	<0.05

Table 16: Grades of envenomation and its comparison with S.CRP values

S. CRP	Xie Y, et al.[2]	This Study
Mild	7.78□1.62	**9.96±2.86**
Moderate	19.46□13.74	**23.42±16.42**
Severe	39.29□19.27	**23.61±15.54**
p Value	0.01	**0.01**

GRADES OF ENVENOMATION AND ITS COMPARISON TO S. CRP AND LDH IN OUR STUDY GROUP (P VALUE BETWEEN MILD AND SEVERE ENVENOMATION GROUP)

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Table 17: Grades of envenomation and its comparison to S. CRP and LDH inour study group

ENVENOMATION	S. CRP AT PRESENTATION	S. CRP AT 24 HOURS	S. LDH AT PRESENTATION	S. LDH AT 24 HOURS
NO	3.12□2.78	3.78□2.94	147.28□8.78	174.47□20.49
MILD	9.96□2.86	14.26□5.46	207□7.07	267□7.01
MODERATE	23.42□16.42	31.27□20.30	290.10□40.19	322.28□51.79
SEVERE	23.61□15.54	31.18□21.50	334.57□81.58	368.03□96.15
p value	0.01	0.01	0.02	0.02

When comparing S.LDH levels upon admission and again 24 hours later, we discovered a statistically significant (p 0.05) difference in the envenomed group. In addition, there was a notable difference between patients presenting with severe and moderate envenomation (p value 0.02). A study done by Bhagwat K, et al.[29] Results from a study conducted in Maharashtra on 50 snakebite patients indicated that S. LDH recordings were higher in snake bite victims than in the control group both upon admission and 24 hours later (p value 0.05). However, we observed no overlap in S.LDH values between our research and Bhagwat K, et al, [29](p value 0.325). A study done by Kandaswamy S, et al. [28] A study conducted in Tamil Nadu with 30 snakebite patients revealed a statistically significant difference (p 0.01)

Blood lactate dehydrogenase (LDH) levels were taken upon admission from both those who had been bitten by haemotoxic snakes and a control group. At-admission LDH levels in patients with envenomation were comparable between our research and another Kandaswamy S, etal.[28] (p value 0.03).). This may be because our patient demographics and envenomation severity compare well to those of the previously cited study Kandaswamy S, et al [28].

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Data from this investigation demonstrated a statistically significant disparity between the S CRP readings of the mildly and seriously ill individuals upon admission and again 24 hours later (p value 0.01). In a study by Xie Y, et al, [26] Patients with pit viper envenomation in China were classified as either mild, moderate, or severe. S.CRP levels varied significantly (p 0.01) among the three study groups.

Greater rates of pit viper bites, variations in the study population, and/or the presence of systemic envenomation all contribute to their group's higher mean envenomation grade compared to the other.

Two individuals in our research had elevated S.CRP levels while showing no signs of envenomation. No one could figure out what had caused it.

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SUMMARY

The purpose of the research was to examine how Serum CRP and LDH levels are related to hemotoxicity in people who have suffered snake bites.

- Patients' mean age was 41,4 years old, and the majority fell in the 18-50 age range.
- Lower limbs were the most common target, accounting for 86% of snakebites.
- A majority of our patients (72%), who were bitten by snakes, arrived to the hospital within 6 hours.
- More over half of our patients (42%), in fact, showed signs consistent with mild to severe envenomation.
- Our investigation found that hepatotoxic envenomation was the most prevalent kind of envenomation by a significant margin (67.4%).
- Most of our patients (46%) were given 30 or more vials of Polyvalent ASV.
- Of all hematological parameters, WBCT was the most usually off. Only 27% of our patients had an abnormal PT/INR ratio, however this was not connected with the risk.
- At admission and after 24 hours, S.CRP levels were significantly higher in the severely ill than in the mildly ill group among those with encephalitis (p value 0.03).
- S.LDH levels were observed to be significantly higher in the severely envenomed group compared to the moderate envenomation group (p value 0.02).

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CONCLUSION

1) Most cases of envenomation appear as hemotoxic reactions.
2) Patients received an average of almost 30 vials of Polyvalent ASV, indicating a high prevalence of systemic envenomation.
3) In envenomed individuals, WBCT was the most often abnormal haematological measure. Nonetheless, their PT/INR ratios did not seem to be as out of whack as those of the majority.
4) S CRP levels were substantially higher in patients with severe envenomation than in those with moderate envenomation.
5) There was a notable difference in the S LDH levels of those who had suffered moderate and severe envenomation.

LIMITATIONS

- The population under study as well as species of snake found in this part of south western Karnataka might vary as compared to those in the other study groups**.**
- A control group to compare the levels of S.CRP and LDH to that of envenomed.

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ANNEXURE

PROFORMA

NAME: AGE:

SEX: OCCUPATION:

ADRESS:

DATE OF ADMISSION:

DATE OF DISCHARGE:

1) DATE SNAKE BITE :
2) SITE OF SNAKE BITE:

SYMPTOMS

HEMATURIA: HEMATEMESIS: HEMOPTYSIS: EPISTAXIS:

MELAENA: BLEEDING GUMS:

SIGNS

A) LOCAL

PAIN AT THE SITE OF BITE:

SWELLING AT THE SITE OF BITE: BLISTERS:

ECCHYMOSIS: BLEEDING:

HEMATOMA: REGIONAL LYMPHADENOPATHY:

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SKIN COLOUR CHANGES: SIGNS OF NECROSIS:

CELLULITIS:

SYSTEMIC

PULSE RATE: BLOOD PRESSURE:

RESPIRATORY RATE: TEMPERATURE:

VIALS OF ASV:

INVESTIGATIONS

Hours	O hours	6th hour	12th hour	18th hour	24 th hour
Bleeding time					
Clotting time					
WBCT					

	0	24
HAEMOGLOBIN		
TC		
DC		
ESR		

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LDH		
CRP		
URINE MICRO		
APTT		
PT		
INR		
PLATELET COUNT		
S TOTAL BILIRUBIN D/I		
SGOT /SGPT		
S ALBUMIN		
ECG		

P SMEAR:

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INFORMED CONSENT FORM

Name of the volunteer/study subject:

Age: Sex:

Address:

This is to declare that I.....have

Understood every aspect of **"TO STUDY THE UTILITY OF S.CRP AND LDH AS MARKERS OF HEMOTOXICITY IN SNAKE BITE VICTIMS"** conducted by PG resident **DR. SUNIL R** in **DEPT OF MEDICINE** shri B. M. Patil Medical college, hospital & research Centre Vijayapura. The details of the study have been explained to me in an understandable manner and to my satisfaction. I have read this completely and I am sure that the data generated will be kept in an most confidence. I completely agree with this and shall follow all medical directions given to me. On my own decision and self-interest, I give my consent to take part in this study.

I keep my option to leave the study at any time I desire to do so. I am allowed to freely ask questions regarding the research study. I do agree to take part in the study voluntarily

Signature/thumb impression of the volunteer Date:

Signature of the principal investigator: Date:

Name and signature of impartial witness

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KEY TO MASTER CHART

1. IP number of patient
2. Age in years
3. Sex
    a. M = Male
    b. F = Female
4. Occupation
5. Date of admission
6. Date of discharge
7. Duration of stay in hospital
8. Date of snakebite
9. Interval between snakebite and presentation to hospital
10. Site of snakebite
    a. RL = Right lower limb
    b. LL = Left lower limb
    c. RH = Right Hand
    d. LH = Left Hand
11. Time Interval (Between snakebite and presentation to hospital)
    a. 6 = Less than 6 hours
    b. 24 = 6-24 hours
    c. 48 = 24- 48 hours
12. Grade of envenomation
    a. MIL- Mild
    b. MOD- Moderate

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c. SEV- Severe

13. Local bleeding

    a. Y = Yes

    b. N = No

14. Systemic bleeding

    a. Y= Yes

    b. N= No

15. HB- Hemoglobin in g/dL

16. TC- Total leukocyte count (per cumm)

17. Platelet count:(per cumm)

18. PT (in seconds)

19. INR

20. APTT (in seconds)

21. S CRP

22. S. LDH

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MASTER CHART

Sl.No.	Sex	Age	Site Of Bite	Time Inerval	Grade Of Evenomation	Bleeding Manifestations	Vials of ASV	Hb	TC	Platelet	PT	APTT	INR	WBCT >20min	LDH0	LDH24	crp0	crp24
1	Female	62	RL	6	MOD	Yes	40	11	15500	152000	11.8	26	1.3	Yes	264	294	18	24.3
2	Female	53	RL	24	MOD	Yes	5	14	8500	189000	9.7	23	1.11	No	156	182	0.6	0.97
3	Male	25	RL	6	SEV	Yes	20	13	13600	156000	10.8	24	1.16	No	254	287	15.7	13.2
4	Female	23	LL	6	MIL	Yes	10	13	9200	215000	9.6	18	0.98	No	156	172	0.01	0.2
5	Male	72	RL	6	SEV	Yes	50	9.2	20600	68000	120	120	NR	Yes	302	364	42.4	59.7
6	Male	41	RH	6	NO	No	NIL	15	7600	256000	9.6	15	1.01	No	132	174	0.8	1.3
7	Male	40	RH	6	MOD	Yes	20	13	7500	179000	10.8	22	1.14	No	126	152	6.7	8.92
8	Male	48	RL	6	MOD	Yes	50	13	14500	153000	11.1	26	1.26	Yes	313.2	326.3	11.3	14.8
9	Female	42	RL	6	MIL	Yes	40	12	10200	155000	11	23	1.26	Yes	272.3	312	32.4	44.6
10	Female	64	RL	6	MOD	Yes	50	10	14900	87000	17	35	1.87	Yes	264	332.7	22.2	28.6
11	Male	37	RL	6	MIL	Yes	5	14	6700	198000	10.3	18	0.96	No	202	262	6.74	8.72
12	Female	32	LL	6	MOD	Yes	50	12	15100	128000	15.5	32	1.76	Yes	256	302	25.2	38.9
13	Male	71	RL	48	MOD	Yes	40	13	9200	152000	11.2	26	1.32	Yes	118	124	0.4	0.67
14	Male	76	LL	6	SEV	Yes	50	9.8	17800	72000	120	120	NR	Yes	492	561.7	14.8	39.6
15	Male	44	LL	6	SEV	Yes	50	9.7	18300	69000	120	120	NR	Yes	456.2	496.3	56.8	72.9
16	Male	20	LH	6	NO	No	NIL	14	7200	222000	10	16	1.01	No	119	127	8.6	10.4
17	Female	22	RH	6	NO	No	NIL	15	6800	231000	10.2	16	1.12	No	108	113	0.3	0.45
18	Male	67	RL	6	MIL	Yes	40	14	9500	145000	10.9	26	1.18	Yes	301	333.4	62.8	78.6
19	Male	62	RL	6	MOD	Yes	5	14	6700	196000	10.3	25	1.18	No	142	174	0.62	0.71
20	Female	50	RL	6	MIL	Yes	40	13	7800	168000	10.9	26	1.26	No	119	127	7.4	22.6
21	Male	57	RL	24	MIL	Yes	20	14	7800	176000	10.5	24	1.16	No	284.2	292.2	22.4	24.6
22	Female	43	LL	6	SEV	Yes	5	13	6700	177000	9.8	23	1.04	No	198	212	10.92	14.4
23	Male	29	LH	6	NO	No	NIL	15	8300	214000	10	15	0.98	No	115	142	0.73	0.52
24	Male	55	RL	24	MOD	Yes	50	13	13900	142000	12.3	28	1.43	Yes	124	157	14.4	29.2

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	Sex	Age	Site Of Bite	Time Inerval	Grade Of Evenomation	Bleeding Manifestations	Vials of ASV	Hb	TC	Platelet	PT	APTT	INR	WBCT >20min	LDH0	LDH24	crp0	Sl.No.
25	Male	74	RL	24	MOD	Yes	40	13	10300	167000	11	25	1.2	Yes	303.8	292.4	7.2	11.4
26	Male	64	RH	6	MIL	Yes	5	14	7500	189000	10.5	25	1.23	No	212	272	9.2	10.3
27	Female	40	RL	24	MIL	Yes	20	12	8500	142000	11.1	26	1.19	Yes	203	244	0.49	0.41
28	Male	43	RH	6	NO	No	NIL	14	7500	236000	10.2	25	1.12	No	106	121	0.28	0.34
29	Female	37	LL	6	MOD	Yes	20	13	8800	168000	11.3	26	1.24	Yes	284	272.3	44.2	38.4
30	Female	71	LL	6	SEV	Yes	40	11	14700	124000	17	32	1.68	Yes	135	178	0.07	0.12
31	Male	50	RL	48	MIL	Yes	50	9.8	16200	88000	17.2	34	1.65	Yes	284	313.8	19.7	11.3
32	Male	44	RL	24	MOD	Yes	5	14	6500	189000	10.3	19	1.02	No	184	216	0.18	0.29
33	Female	51	RL	6	SEV	Yes	50	9.1	19000	67000	120	120	NR	Yes	272.6	294.8	9.4	13.8
34	Female	68	RL	24	MOD	Yes	40	11	9900	134000	12.4	32	1.7	Yes	265.5	295.7	19.4	24.3
35	Female	44	RL	6	MOD	Yes	10	13	7200	187000	10.7	25	1.18	No	202	218	12.23	19.7
36	Female	42	RL	6	MOD	Yes	20	11	8800	152000	10.9	26	1.22	Yes	256	289	11.2	16.4
37	Female	50	LL	24	MIL	Yes	5	13	8000	167000	10.9	26	1.2	Yes	172	196	0.3	0.38
38	Female	47	RL	24	MOD	Yes	40	11	10200	164000	10.8	25	1.17	No	346	412	15.4	34.8
39	Male	21	RL	24	NO	No	NIL	15	7800	252000	9.9	17	1.01	No	119	123	0.97	1.73
40	Male	51	RL	6	SEV	Yes	50	9.6	17500	70000	120	120	NR	Yes	276.4	289.6	13.8	17.6
41	Male	60	RL	6	MIL	Yes	5	13	7500	187000	10.7	25	1.24	No	144	172	1.23	2.27
42	Male	61	LL	6	MIL	Yes	5	13	7500	182000	10.5	25	1.14	No	174	218	0.84	0.89
43	Female	34	LL	6	NO	No	NIL	15	8900	243000	10	17	0.98	No	122	143	7.4	9.6
44	Male	46	RL	24	MOD	Yes	20	13	9200	176000	11.1	27	1.32	Yes	312	342.4	48.3	62.4
45	Male	42	RL	6	MIL	Yes	40	13	10000	166000	11.2	28	1.52	Yes	147	188	0.34	0.67
46	Female	47	RL	24	MOD	Yes	5	12	7800	187000	10.9	26	1.28	No	192	202	0.05	0.09
47	Male	41	RL	6	SEV	Yes	50	12	14900	85000	16.8	34	1.82	Yes	286.2	307.2	15.4	19.2
48	Male	64	RL	6	MOD	Yes	50	13	13600	156000	11	25	1.22	Yes	328.6	358.6	17.2	14.4
49	Female	49	RL	6	SEV	Yes	40	11	16200	121000	16	35	1.9	Yes	402.8	464.1	39.2	58.6
50	Female	61	RL	6	MOD	Yes	5	12	7500	157000	11.2	25	1.24	Yes	186	208	0.19	0.11