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RESEARCH ARTICLE

CLINICAL PROFILE OF SNAKE BITE POISONING CASES ADMITTED AT A TERTIARY CARE CENTRE IN NORTH KERALA

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Abstract

Introduction: Snake envenomation is a common medical emergency and the epidemiological features vary from region to region.A descriptive crossectional study was conducted at Govt Medical college Kozhikode to review the clinical profile of snake envenomation in Malabar region , Northern Kerala . This tertiary care centre caters to all 6 districts of Kerala including Kozhikode,Kannur,MalappuramKasargod,Palakkad and Wayanad .

Objectives:1.To study the clinical profile of poisonous snake bites .

Methods: Sampling Procedure: This was a descriptive cross-sectional study of all patients admitted with snake envenomation at Snake Bite unit, Govt Medical College, Kozhikode.Study period was from July 2017 –June 2018. Patients are included if they had a definite history of poisonous snake bite and developed features of envenomation and are evaluated based on a proforma with detailed history and clinical examination. Data are collected regarding age, sex, occupation, time of bite, symptoms, investigations, mode of treatment given and complications.Sample size is 110.

Study Analysis: The data wasanalysed using computer software, Statitical Package for Social Sciences(SPSS) version 18.The data is expressed in its frequency and percentage to elucidate the associations and comparisons between different parameters .Qualitative variables are analysed using Chi –square test and quantitative variables by t –test.The Institutional Ethics Committee of Govt. Medical College,Kozhikode approved the research project. Written informed consent is obtained from all patients who had participated in this study in their vernacular language.One hundred and two cases of poisonous snake bite, admitted atGovt Medical College Kozhikode over a period from July 2017 to June 2018 constituted the material for the study. Detailed history with special reference to the type of snake, circumstances leading to the bite and clinical consequences are studied and final outcome is noted.Hemotoxic symptoms present in 40(39.2%) victims , neurotoxic features present in 32(31.3%) victims ,both hemotoxic and neurotoxic features are present in 12(11.7%) victims

Conclusion: Poisonous snake bite is a life threatening emergency in our region. Morbidity and mortality due to this can be reduced by early administration of antisnake venom and management of complications. So prompt referral of victims with poisonous snake bite to centres

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where facilities in managing snake bite is crucial in preventing mortality.

Introduction:-

Snake bite poisoning is an occupational health hazard often faced by farmers, plantain workers, herders and laborers of tropical and subtropical countries. The bites inflicted are usually accidental as when snakes are trodden upon or could result due to sleeping on floor and open style habitation. The most affected region in the world is South East Asia because of dense population and extensive agricultural activities[1].WHO has included snake bite in the list of neglected tropical conditions. The true global burden of snake bite is not known due to lack of standardized reporting and under reporting. It is documented that there are 54,00,000 snake bites with 2,50,000 envenomations and around 1,25,000 fatalities annually in the world[2.]However, there is no accurate statistics of morbidity and mortality which could certainly be higher because most of the victims initially approach traditional healers for treatment and are not registered in the hospital. Ignorance of primary care (first aid) and approaching traditional healers further delays proper treatment and contributes to high mortality and morbidity [3]

Kerala is recognized as having a major problem with snake bite. The five common poisonous snakes found in Kerala are Indian cobra, King cobra, Russell's viper, Saw scaled viper and Common Krait. Out of these (Big four) Indian cobra, Russell's viper, Saw scaled viper and Common krait are the most dangerous, since King cobra usually inhabit in dense forests and hence rarely comes in contact with humans. In northern Kerala along with these snakes, Pit vipers are also common.

Among the highly venomous snakes, four of the namely, "the Cobra (Najanaja), the Russell's viper (Daboiarusselii), the Saw-scaled viper (Echiscarinatus) and the krait (Bungaruscaeruleus)" are common causes of envenomation and include in the Anti snake venom mix.

General Symptoms [5]

Fear.anxiety, fright

Children usually appear more apprehensive. Here the fear may be the causes for many symptoms on presentation.

Pain and local swelling

Most snake bites present with pain and some may also produce local swelling. Severe pain is most probably be related to the occurrence of intense swelling. The pain is most severe in viper bites which may occur along with swelling within 5 minutes to 2 hours of the bite. Viper bites also presents with rapidly appearing echymoticoedema and there is often a blood stained discharge from the site.In cases of cobra bite, victims frequently complain of burning sensation at the site.

Clinical Features:

The evolution of symptoms and sigs of envenoming depends on the nature of the venom, the dose and the site of injection. The clinical features of snake bite can be divided into local and systemic.

Local manifestation:

Local pain is the commonest symptom it usually starts within minutes of the bite. During the next few hours it intensifies, spreads towards the trunk and becomes localized in the lymph nodes draining the bite site. Some patient complains of vague abdominal or epigastric pain within 6 hrs of bite. Local swelling at the site of bite or beyond is maximum in 1 to 4 days after bite (minutes to 48-72hrs). Both local pain and swelling is more in viper bite. This is followed by oedema, swelling and appearance of bullae which can progress rapidly to involve the trunk. Tingling & numbness over the tongue, mouth, scalp and paraesthesia around the wound occur mostly in viper bites. Local bleeding including petechial or purpuric rash is seen most commonly with this family.

The local area of bite may become devascularized with features of necrosis predisposing to onset of gangrenous changes. Generally Elapid bites result in early gangrene usually wet type where as viper cause dry gangrene of slower onset (over weeks), it is caused mainly by direct cytotoxic venom effect.

Signs and symptoms of different snakes:

Cobra:

Regional lymphadenopathy is often absent. Victim experiences severe pain at bite site having a fangs marks. Rapid progression of swellingof the skin and the site around the bite is ecchymosed. Subsequently developed tense blebs and massive damage of skin and subcutaneoustissue due to myocytolysis result in huge nonhealingulcers.Victim may die of lethal ventricular arrhythmias, cardiogenic shock , massive myocardial infarction or due to a surge ofcatecholamines because of the threat of death.Sinus bradycardia, A-V block and hypotension are due to cardio-depressant action of venom.Suddenrespiratory arrest without any other neurological manifestations can occur resulting in anoxic cardiac arrest. Rapid ptosis andbulbar palsy accompanied with respiratory depression can occur. Rarely hematotoxic effects are seen. Blurring of vision and loss of accommodation is earliest sign of neurological envenoming.[1]

Common Krait:

Acute abdominal pain (due to cholecystokinin release)[1], vomiting, staring look, blurring of vision, gooseflesh, salivation, hypertension, pulmonary edema (autonomic symptoms).A syndrome of neuromuscular paralysis that falls into three distinct phases. The first phase is rapid onset phase leading profoundparalysis within 30-60 min. The second phase is a stable phase of deep paralysis lasting 2-3 days. The third phase is a recovery phase2-3 weeks[1]. This explains the prolonged period of ventilatory support and intensive care requirements essential for recovery.Envenoming by different species of krait in addition can cause resistant neuroparalysis[5], hyponatremia[5],renalfailure,hyperkalemia, myocytolysis, myocardial damage with lethal arrhythmias and pulmonary edema.T wave inversion in electrocardiograph due to hypoxia, accompanied with vague chest discomfort due to respiratory muscle weaknessanddyspnea can occur.Bradycardia, sweating, raised blood pressure, pulmonary edema, starring look, blurring of vision or at times photophobia,ptosis, drooling of saliva, difficult to protrude the tongue beyond teeth margin, slurred or nasal twang speech ,dysphagia,dyspnea, external ophthalmoplegia, weakness of neck muscle, respiratory muscle and lastly the diaphragm.Quadriplegia with aphasia and dilated pupils has also been observed .

Locked in syndrome may be misdiagnosed as brain death. Patient can only communicate by flickerof toes and fingers or pelvic girdle. Frontalis muscle has dual nerve supply may be spared in locked in syndrome, patient attempt to movethis muscle on command movement can be felt by putting palm over forehead confirm that patient is conscious,hence it is called pseudo-coma. Venom induced paralysis of pupillary muscle causing nonreactive dilated pupils should not be taken as a sign of irreversible brain damage.

Acute renal failure due to viper bite is attributed to hypotension due to raised circulating bradykinin, hypovolemia due to bloodloss either by external bleed . Renal tubular blockade can occur by free hemoglobin, myoglobulin.Other mechanisms of renal failure are hyperkalemia, tubular damage or interstitial nephritis. Victim experience severe local pain at the site of the bite. Within 6-8 hrs rapid swelling progresses to the whole limb, may extend to abdominal or chest wall. Local ecchymosis and tense blebs over bitten part.Bleeding results in the development of compartment syndrome, characterized by swelling, painon full passive movements, and loss of sensation over the nerve areas passing through the compartment.Subsequently, the development ofwet gangrene or nonhealing ulcer. If untreated the bitten part usually toe or finger results in auto amputations. Lymph nodes proximal to the bite become enlarged and tender. Tenderness along hunter's canal often noted, over bitten lower limb.

Hemostatic failure:

Pro-coagulant content of venom causes initiate rapid thrombosis, hypofibrinogenemia as result of consumption coagulopathy, hematuria, bleeding in the skin and pituitary hemorrhage. Russell's bite victims subsequently developed amenorrhea, Sheehan's syndrome, loss of libido due hypopituitarism reported from southpart of India.[5]

Enhanced capillary permeability seen in the form of pleural, pericardial effusion, ascites and conjunctival hemorrhage or congestion ,resistant shock syndrome responsible for a high fatality (capillary leaking syndrome). Ptosis, bulbar palsy, internuclearophthalmoplegia and respiratory paralysis due to presynaptic neuromuscular block in Russell's viperbite poisoning often seen and reported from Kerala[6] and Sri Lanka[21]

Sea snakes:

Headache, sweating, vomiting tingling numbness, foreign body sensation in the throat and swelling of the tongue are noticed. Within 30 min to 3 h after bite victim experience severe muscle pain, marked tenderness all over muscles,

trismus, muscular paralysis, respiratory arrest, without local manifestations at the site of the bite.Due to myotoxic effects of the venom resulting in liberation of potassium into circulation,there will be tented T waves, widened QRScomplex in ECG.Due to massive liberation myoglobin into circulation, it blocks the renal tubules, and there can be acute renal shut down. Brown coloured urine is a diagnosticof myoglobinuria.

Echiscarinatus:
Soon after the bite within one hour there is development of swelling over the bitten part.Within 60-120 min victim experiences a painful lymphadenopathy at drainage area of the bitten part.If untreated swelling progressed to the whole limb or the chest wall.Ecchymosis seen over the bitten part or may spread over lymphatic drainage areas.

Acute bleeding in the form of gum bleeds or bleeding from abrasion on the other part of the body or from the venipuncture site seenwithin 90-120 min of bite. At timeswhen patient remains untreated bleeding persisted for 1-2 weeks in the form of blood stain sputum,hematuria and disappeared of its own.Natural immunity against the Echiscarinatus venom developed in cases of repeated bite by same species in an endemic areas asminimum clinical involvement in subsequent bite reported in Jammu region.Renal failure due to echiscarinatus reported from Pondicherry and Jammu areas but not from Maharashtra.[12]

Green pit viper/bamboo viper:
Rarely victim manifests external bleeding or renal failure. Snake bite cases are reported from Kerala characterized by local edema andrarely a systemic bleeding disorder.[37] Coagulopathy and renal failure due to hump-nosed pit viper have been reported from Kerala which was previouslyconsidered as a non venomous snake.
Acute interstitial nephritis due to snake venom has also beenobserved,Cardiotoxic[1]features include tachycardia, hypotension and ECG changes including sinus tachycardia, ischaemicnon specific ST-T changes and atrioventricularblock. This cardiotoxicity is seen in 25% of viperine bites. Muscle necrosis may also result inmyoglobinuria. Systemic manifestations including hypopituitarism, bilateral thalamic haematoma, intravascular hemolysis, generalized rhabdomyolysis and associated electrolyte disturbance have also been reported[5]

Results:-

Frequency of Constitutional symptoms in various snake bites

Types of Snakes	Vomiting	Abdominal Pain	Giddiness	Anxiety
Common Cobra	3(17.6%)	5(29.4%)	6(35.3%)	5(29.4%)
Common Krait	3(37.5%)	4(50%)	4(50%)	4(50%)
Russell's Viper	14(53.8%)	16(61.5%)	17(65.4%)	14(53.8%)
Pit Viper	5(10%)	8(16%)	12(24%)	14(28%)
Saw scaled viper	0	0	0	0
P value	<0.001	0.001	0.009	0.219

In present study,constitutional symptoms like vomiting and abdominal pain is present predominantly in Russell's viper bites in 14(53.8%) of victims and 16(61.5%) respectively, followed by giddiness 17(65.4%) and anxiety 14(53.8%).Constitutional symptoms are then prominent in pitviper bites ,among them 8(16%) had abdominal pain,5(10%) had vomiting 12(24%) had giddiness and 14(28%) had anxiety.Frequency of constitutional symptoms like vomiting and abdominal pain is high in Krait bites as compared to Cobra bites.In the case of Sawscaled viper there was no any constitutional symptoms.

Frequency of Local reactions in various Snake bites:

Snake	Pain	Swelling	Cellulitis	Lymph node enalargement	Bleed from needle site	Blister
Common Cobra	14(82.35%)	12(70.6%)	10(58.8%)	4(23.5%)	4(23.5%)	4(23.5%)
Common Krait	8(100%)	7(87.5%)	6(75%)	1(12.5%)	3(37.5%)	3(37.5%)
Russell's Viper	24(92.3%)	22(84.6%)	20(76.9%)	15(57.7%)	17(65.4%)	16(61.5%)
Pit Viper	44(88%)	36(72%)	36(72%)	7(14%)	14(28%)	21(42%)

Saw scaled viper	1(100%)	1(100%)	1(100%)	0	0	0
Pvalue	0.689	0.662	0.671	0.001	0.009	0.129

In the present study pain and swelling was the most prominent local feature in all types of snake bites followed by Cellulitis which was more in Russell's Viper ,Krait and Pitvipers followed by bleeding from needle site which was present more in Russells viper bite .Local lymph node enlargement and blister was present more in Russells viper bites 15(57.7%) and 16(61.5%) respectively.Pain and swelling is prominent in Cobra bites as compared to Krait bites ,

Frequency of local and systemic symptoms

Type of Snakes	Only Local symptoms Present	Local and systemic symptoms Present	Total N =102
Common Cobra	6(35.2%)	11(64.7%)	17
Common Krait	2(25%)	6(75%)	8
Russell;s Viper	8(30.7%)	18(69.2%)	26
Pit viper	36(72%)	14(28%)	50
Saw scaled viper	1(100%)	0	1
Total	53(51.9%)	49(35.1%)	102
P value 0.001			

Only local reactions are present in 6(35.2%) of Cobra bites, 2(25%)of Krait bites,8 (30.7%)ofRussell's viper bites and 36(72%)of Pit viper bites and one Sawscaled viper bite.

Frequency of haemotoxic features in various snake bites

Snake	Subconjuctival Chemosis	Bleeding gums	Hemetemesis	Hematuria	Epistaxis	Hemoptysis
Common Cobra	2(11.8%)	4(23.5%)	1(5.9%)	1(5.9%)	3(17.6%)	4(23.5%)
Common Krait	2(25%)	3(37.5%)	1(12.5%)	2(25%)	3(37.5%)	2(25%)
Russell's Viper	13(50%)	17(65.4%)	10(38.5%)	12(46.1%)	16(61.5%)	12(46.1%)
Pit Viper	6(12%)	14.(28%)	6(12%)	3(6%)	15(30%)	6(12%)
Saw scaled viper	0	0	0	0	0	0
P value	0.004	0.013	0.021	<0.001	0.071	0.040

Bleeding gums is the prominent hemotoxic feature in Russell's viper bites followed by epistaxis,subconjuctivalhemorrhage,hemoptysis, hematuria and hemetemesis. Epistaxis is the most prominent feature in Pitviperbites,followed by bleeding gums ,hemoptysis ,subconjuctival hemorrhage ,hemetemesis and hematuria .

Frequency of Neurotoxic features in various Snake bite

Snake	Drowsiness	Ptosis	Dysphagia	Dysarthria	Ophthalmoplegia
Common Cobra	2(11.8%)	10(58.8%)	3(17.6%)	1(5.9%)	9(52.9%)
Common Krait	5(62.5%)	5(62.5%)	1(12.5%)	0	4(50%)
Russell;s Viper	9(34.6%)	6(23.1%)	3(11.5%)	1(3.8%)	5(19.2)
Pit viper	4(8%)	2(4%)	1(2%)	1(2%)	2(4%)
Saw sacled viper	0	0	0	0	0
Pvalue	0.004	<0.001	0.246	0.902	<0.001

Ptosis is the most prominent neurotoxic feature Krait and Cobra bites bites followed by drowsiness, ophthalmoplegia, dysphagia and dysarthria. Drowsiness is the prominent neurotoxic feature in Viper bites followed by ptosis ophthalmoplegia,dysphagia and dysarthria .

Frequency of mixed features in various snake bites

Type of Snakes	Mixed HT & NT	Either HT or NT	Total N =102
Common Cobra	3(17.6%)	14(82.4%)	17
Common Krait	2(25%)	6(75%)	8
Russell's Viper	5(19.2%)	21(80.8%)	26
Pit viper	2(4%)	48(96%)	50
Saw scaled viper	0	1(100%)	1
Total	8	94	102
P value 0.303			

Haemotoxic and neurotoxic features are found in 3 (17.6%) of Cobra bites,2(25%) of Krait bites,5(19.2%)of Russell's viper bites,2(4%) of Pit viper bites.All the victims bitten by Russell's viper who died has mixed hemotoxic and neurotoxic features.

Discussion:-

Clinical features:

Constitutional symptoms:

Abdominal pain wastpredominantily present in 16 (61.5%) of Russell's viper bites,followed by 4(50%) of Krait bites ,5(29.4%) of Cobra bites and 8(16%) of Pit viper bites and absent in one Saw scaled viper bite.Gastro intestinal symptoms observed in 32.2% casesin a study conducted by Monterioetal. While Saini et al[18]reported it in 16% cases.Persistent vomiting and abdominal pain in Russell's viper bites due tointraperitoneal bleed and pancreatitis is an indication for antisnake venom administration.

Local reactions:

Out of 102 cases ,6(35.3%) in Cobra bites ,2(25%) of Krait ,8(30.8%) of Russell's viper ,36(72%) of Pitviper and one saw scaled viper presented only with local reactions. In Cobra bites, pain was the prominent symptom in 14 (82.5%) victims followed by swelling 12(70.6%), cellulitis in 10 (58.8%).Bleeding from needle site ,regional lymph node enlargement and blister was present in 4(23.5%) of victims .In Krait bites pain was the most prominent feature present in 8(100%) of victims ,swelling was present in 7(87.5%) ,cellulitis in 6(75%) ,bleeding from needle site and blisters in 3(37.5%) and regional lymphadenopathy in 1(12.%) of victims .In Russell's viper bites pain was the most prominent local feature in 24(92.3%) followed by swelling 22(84.6%) ,cellulitis in 20(76.9%),bleeding from needle site in 17 (65.4%),blisters in 16(61.5%) and regional lymphadenopathy in 15 (57.7%).In Pitviper bites also pain was the prominent feature in 44 (88%),swelling and cellulitis in 36(72%),blisters in 21(42%),bleeding from needle site in 14(28%) and regional lymphadenopathy in 7(14%).In a study conducted by Anil kumar etal[10] pain and swelling was the prominent local feature in snake bites .Pain in 98(57.9%) victims was the most common local reaction in a study conducted by Anjum A et al[11] ,Bawaskar HS et al[4] from Western India studied 182 cases, of whom 53 (96%) had local edema with fangs marks, 40 (72%) had active bleeding from vein puncture site and abrasion over other part of body.Redewad N et al[13]from Central India studied 203 patient of snake bite from June 2011 to September 2013 and found cellulitis (90.6%) being most common presentation. Chaudhari[14]TS et al found 260 patients (100%) had pain at site of bite, local swelling in 252 (96.9%) and blackening of skin, blebs in 18 (6.9%). Severe local symptoms observed among viper envenomation were also in accordance with other studies..Swelling and pain at the site of the bite were the most common symptoms among the patients with viper envenomation.

Haemotoxic features in relation with types of snakes:

Out of 102cases 40 presented with haemotoxic features .In Russell'sviperbites,bleeding gum was the most prominent feature in 17(65.4%),followed by epistaxis in 16(61.5%),Sub conjunctival hemorrhage in 13(50%),hematuria and hemoptysis in 12(46.15%) and Hemetemesis in 10(38.5%).In Pit viper bites bleeding gums and epistaxis was more prominent in 15(30%) and 14 28%) followed by subconjunctival hemorrhage and hemoptysis in 6 (12%) .In Cobra bites bleeding gums and hemoptysis are the prominent hemotoxic features in 4(23.5%) of victims followed by epistaxis in 3(17.6%),Subconjuctival hemorrhage in 2(11.8%) ,hematuria and

hemetemesis in 1(5.9%). In Krait bites bleeding gums and epistaxis was prominent hemotoxic feature in 3(37.5%) of victims followed by hematuria and subconjunctival hemorrhage in 2(25%) and hemetemesis in 1(12.5%) of victims where as bleeding manifestation was absent in one case of Saw scaled viper.In our study Bleeding gums and epistaxis was the prominent hemotoxic feature .

Neurotoxic feature in relation with types of Snakes:
Out of 102 cases ,32 cases presented with neurotoxic features .In Cobra bites ,the ptosis was the prominent feature in 10(58.8%) ,followed by ophthalmoplegia in 9(52.9%),dysphagia in 3(17.6%),drowsiness in 2(11.8%),dysarthria in 1(5.9%) and respiratory paralysis in 1(5.9%).In Krait bites ptosis and drowsiness was prominent in 5(62.5%) followed by ophthalmoplegia in 4(50%) dysphagia in 1(12.5%) of victims .In Russell's viper bites Drowsiness was prominent in 9(34.6%) followed by ptosis in 6(23.1%) , ophthalmoplegia 5(19.2%), dysphagia in 3(11.5%),dysarthria 1(3.8%).In Pit viper bites drowsiness was more prominent neurotoxic feature in 4(8%)followed by ptosis and ophthalmoplegia in 2 (4%) ,dysphagia and dysarthria in 1(2%) of victims .Neurotoxic feature was absent in one reported case of Saw scaled viper.We can conclude that drowsiness,ptosis and ophthalmoplegia are the prominent neurotoxic features in snake bites .Mixed neurotoxic and hemotoxic features are seen in 3(17.6%) of Cobra bites,2(25%) of Krait bites,5(19.2%) of Russell's viper bites,2(4%) of Pit viper bites.

In a study conductedby [16]Kavitha saravuetal,ptosis were seen in 11 (73.33%) and 13 (86.66%) patients with cobra bite, respectively. Difficulty in breathing and weakness of the limbs were seen in 11 (73.33%) patients. Diplopia, dysphagia, and dysarthria were seen in 4 (26.66%), 3 (20%), and 1 (6.66%) patients, respectively. Cellulitis seen in 12 (80%) and respiratory paralysis in 11 (73.33%) patients.In krait bites Abdominal pain was one of the common symptom in 4 (80%) patients followed by neurological symptoms like dyspnea in 4 (80%), ptosis in 3 (60%), dysphagia in 2 (40%), Viper bite was characterized by severe local symptoms. Swelling and pain at the bite site were the commonest symptoms seen in 51 (91.07%) and 49 (87.5%) patients, respectively. Persistent bleeding from fang wounds was seen in 23 (41.07%) patients. Other bleeding manifestations such as bleeding gums in 4 (7.14%), hematemesis in 2 (3.57%), hematuria in 1 (1.78%) cases were less common. Cellulitis (Presence of localized pain, erythema, and swelling) and coagulopathy were the most common complications seen in 44 (78.57%) and 35 (62.50%) patients, respectively. Among the hematotoxic snake bites, bleeding from the site of the bite was the main manifestation, followed by cellulitis, hematuria and echymosis, which were similar to that which were observed in studies which were done in Maharashtra[12]. This difference in the hemorrhagic manifestations in the different studies is attributed to the subtle differences among the venoms of the viperine subspecies in different regions. In a study conducted by Halesha etal[20], the neuroparalytic symptoms which were seen, in the descending order, were ptosis, ophthalmoplegia, bulbar weakness, respiratory muscle involvement, and limb weakness. The reported incidences of the neurological symptoms in 2 Sri Lankan studies[21,22]on neuroparalytic snakebites were,ptosis in 70%–85% cases, respiratory muscle weakness in 18%–45% cases, ophthalmoplegia in 53%-75% cases, and limb weakness in 27%–54% cases respectively.Mixed hemotoxic and nerotoxic feature was more in krait 2(25%) followed by Russell's viper 5(19.2%),Cobra 3(17.6%),pitviper 2(4%).similar findings was observed in study conducted by Paul V etal.[23]

Conclusions:-

1. Abdominal pain and vomiting is predominant in Russell's viper bites as compared to others due to the occurance of intraperitoneal bleed or pancreatitis.
2. Out of total 17 Cobra bites 3(17.6%) showed clinical features of hemotoxicity.Out of 8 Krait bites,3(37.5%) showed clinical features of hemotoxicity.Out of 26 Russell's viper bites ,10 (38.5%) showed the features of neurotoxicity.Out of 50 Pit viper bites ,6(12%) showed features of neurotoxicity

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