STUDY ON EPIDEMIOLOGY, CLINICAL PROFILE AND OUTCOME OF SNAKE BITE ENVENOMATION

DISSERTATION SUBMITTED TO

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For

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CERTIFICATE

This is to certify that dissertation entitled **"A STUDY ON EPIDEMIOLOGY, CLINICAL PROFILE AND OUTCOME OF SNAKEBITE ENVENOMATION"** submitted by **Dr.Rojith K B** to the Tamil Nadu Dr. M.G.R. Medical University, Chennai in the partial fulfillment of the requirement of M.D Degree - Branch I (General Medicine) is an original research work carried out by him under my direct supervision and guidance.

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This is submitted to The Tamilnadu **Dr.M.G.R**. Medical University, Chennai, in partial fulfillment of the requirement for the award of **M.D.** Degree Examination, Branch-I **(General Medicine)** to be held in **APRIL 2010**.

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INTRODUCTION

INTRODUCTION

Snakes are fascinating part of nature. Their colour, movement and secret habits make them more mysterious. India is home to some of the most poisonous snakes in the world, most of which are found in rural areas. [1] Snake bites cause substantial mortality and morbidity in India. A large proportion of snake bites occur when people are working barefoot in the fields, or while walking at night or early morning through fields or along roads. [2] Superstitions, wrong practices, misconceptions [3,4] handicap doctors who care primary attention. [5]. Of 3000 species of snakes known to world, in India, we have around 216 species, out of which 52 are known to be poisonous. [6] Our venomous species belong to two major families: Elapidae, Viperidae.

Snake bite envenomation is a common problem in this part of state.The clinical profile and outcome depends on various factors. Large number of cases are admitted every day in Coimbatore Medical College Hospital. Our study is to analyse the epidemiology of snake bite envenomation cases in this part of state ,to study the clinical profile and various complications of snake bite envenomation , to study the influence of the time interval between the starting of treatment with reference to prognosis , to study the amount of ASV that may be useful in treatment and preventing morbidity and mortality.

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3. To study the influence of the time interval between the starting of treatment with reference to prognosis.

4. To study the amount of ASV that may be useful in treatment and preventing morbidity and mortality.

5. To study the prognostic factors in snake bite envenomation.

REVIEW OF LITERATURE

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Snake bite poisoning is a preventable health hazard in tropics. Very extensive toxicological research is still going on, because of high incidence. It accounts for 100-150 deaths per day in India and the annual deaths per year is around 30,000.[6] It is a cause for major preventable death. In India, the highest incidence are in Tamil Nadu, West Bengal, Maharashtra, U.P and Kerala.[7]

Snake bites happen when the farmers work in field bare footed, unintentionally in a handful of foliage, rolling over the snake while asleep, while working in other plantation and in snake handlers.[8] Males are bitten more often than females[9] **wi**th majority of bites being on the lower extremities.[10] Majority of victim initially are treated by traditional snake bite healers.

Death often occurs even before the patient reaches hospital.[5] The use of protective foot wear, long trousers and lighting at night could reduce the incidence of snake bites. Effective rodent control could also help. [12] Poisonous snakes prevalent in India belong to 3 families. [13] They are:

1) Elapidae: includes Cobras and Krait – Neurotoxic. Renal involvement is less common in victims bitten from members of this family.

2) Viperidae: Russell viper and saw scale viper – Vasculotoxic.

3) Sea snake: Myotoxic.

Renal involvement has been associated with bites from last two families [14), (15)]

COBRAS:

The two species of Cobras found in India [(16)] are common Cobra (NallaPambu) [(17)] and King Cobra (Raja Nagam, Karu Nagam). [(17)] The Cobra has hood which on dorsal side often bears a double or single spectacle mark. It is distributed throughout India. King cobra is black in colour and has hood but no mark on it. They are found in Himalayas, Bengal, Assam and Andaman Islands. [(18)]

KRAIT:

The two species of krait commonly found in India[(16)] are common krait (Kattu Viriyan) [(17)] and banded krait (Pattai Kattu Viriyan). [(17)] The common Krait has steel blue or black with white bars on the back. It is distributed through out India. [(18)] Banded krait is jet black with yellow stripes on its back. They are found in Bengal, Assam, Bihar, Orissa, Madhya Pradesh, Andhra Pradesh and Uttar Pradesh. [(18)]

VIPER:

The two species of viper that are commonly found in India [16] are Russell viper (Kannadi Viriyan)[17] and Saw scale viper (Surruttai Viriyan).[17] Russell viper has a triangular head with V shaped mark pointing forwards. It has a white body with dark semilunar spots. It is seen in Maharashtra, Punjab, Rajasthan, Tamil Nadu and Andhra Pradesh. Saw scaled viper has many white lines on each flank of the back, with diamond shaped areas between the two lines. It has white mark resembling an arrow over the head. It is seen in hills and plains throughout India. [18

RUSSEL VIPER (KANNADI VIRIYAN)

KRAIT (KATTU VIRIYAN)

SAW SCALE VIPER (SURUTTAI PAMPU)

CAT SNAKE (OLAI PAMPU) (NON POISONOUS)

COBRA (NALLA PAMPU)

KING COBRA (RAJA NAGAM)

INDIAN PYTHON (MALAI PAMPU) (POTENTIALLY DANGEROUS TO MAN)

EPIDEMIOLOGICAL FEATURES OF SNAKE BITE

Documented reports of epidemiological studies of snake bite in India are few. Although the exact number of persons inflicted by snake bite is not known, it is estimated that about 2,00,000 persons are annually bitten by snakes in the country and about 15,000 of these are fatal [26]. In a study conducted in Tamilnadu, hospital records showed a mortality of 11.6%. According to a study by Sawai in 1974, 71% of the victims are found in the age group of 11-50 yrs and 75% of the victims were males. A Safdarjung Hospital study showed 81.5% of victims to be field workers. 75% bite occurred outdoors; 88.6% of victims were from rural India[27]. Incidence of snake bite in India shows a seasonal variation. In North India 70-80% of bites are seen in the warmer months may to October [27]. While a study conducted in Calicut Medical College, Kerala showed a maximum incidence of complications also during this period.[28]. Sawai's study in 1974 showed 68% of snake bites occurred in the evening and night; 32% in the morning and afternoon. 72% of bites were on the lower limbs; 25% on the hand and arm; and 3% were on the trunk.

GENERAL FACTS ABOUT SNAKES

Snakes are cold blooded animals without ears or tympanic membrane. They react to vibrations received through the surface on which they rest

rather than air borne vibrations. Snakes do not have a distinct visual system and they do not readily associate stationary objects with danger. Their sense of smell is important. Most land snakes feed on mice, rats and frogs. Kraits and Cobras are exceptional in being mainly snake eaters. No one knows the life span of snakes in the wild. Longevity of some Indian snakes kept in zoos and by individuals include, Indian python : 34 yrs; Banded Kraits:11yrs; Indian cobras 21yrs; saw scaled &Russel viper: 10 yrs; . The south Indian tribals who have based their living on snakes are called 'Irulas'.

SNAKE VENOM:

The venom is a modified salivary secretion. The normal function of snake venom is to immobilize the prey and assist in digestion. The toxic component of snake venom is classified into 4 broad categories namely enzymes, polypeptides, glycoproteins and compounds of low molecular weight. They can also be classified as protein (90-95%) and non protein (5-10%) compounds. [19] It also contains Clostridia, Anaerobes and Gram negative bacilli. Since they cause septicemia, treatment with Tetanus Toxoid, Tetanus Immunoglobulin and metronidazole, gram positive and gram negative antibiotics is warranted.

Table 1: COMPOUNDS PRESENT IN SNAKE VENOM[20]

ENZYMES	Phopholipase A2 (lecithinase), 5' nucleotidase, Collagenase, L-amino acid oxidase, Proteinases, Hyaluronidase, Acetylcholine esterase, Phospholipase B, Endopeptidase, Kininogenase, Factor X, Prothrombin activating enzyme.
NON ENZYME POLYPEPTIDE	(a)Polysynaptic neurotoxin (α bungarotoxin and cobrotoxin),(b) Presynaptic neurotoxin (β bungarotoxin, crotoxin, and taipoxin) ,cardiotoxin, crotamine.
PEPTIDES	Pyroglutamyl peptide
NUCLEOSIDES	Adenosine, Guanosine, Inosine
LIPIDS	Phospholipids, Cholesterol
AMINES	Histamine, Serotonin, Spermin
METALS	Copper, Zinc, Sodium, Magnesium

VARIOUS SNAKES, THEIR FATAL DOSE, QUANTITY OF VENOM INJECTED, AND TIME TO FATALITY [21,22,29]

SNAKE	FATAL DOSE FOR HUMANS	AVERAGE DELIVERED DOSE PER BITE	AVERAGE FATAL PERIOD
Indian cobra	**12mg**	**0 .2g**	**8h**
Common krait	**6mg**	**0.22g**	**18h**
Russels viper	**15mg**	**0.15g**	**3days**
Sawscaled viper	**8mg**	**0.13g**	**41 days**

The clinical presentation of a snake bite victim varies with the age and size of the patient, the species of snake, the number and location of the bites, the quantity and toxicity of the venom. Factors not contributing to outcome are size of the snake and time of bite (day/night). [8]

ENZYMES [25,26,29]

Arginine Esterase:

This enzyme is produced by snakes belonging to Crotalidae and Viperidae.

This enzyme has action similar to thrombin thereby causes coagulation and releases bradykinin.

Phospholipase A:

It has a direct lytic effect, hemolytic effect and causes hydrolysis of phospholipase of RBC membrane, thereby causing sudden fall in BP. [13]

Cholinesterase:

It is an important enzyme of Cobra. It hydrolyses Acetyl choline into cholic acid and acetic acid. It has action similar to d-Tubocurarine and its effect is reversed by neostigmine.

Acetyl Choline – Cobra – Crotalidae:

It has direct action on heart and neuro muscular junction.

Proteinase :

Markedly present in Viper, Crotalidae. It causes tissue changes and destruction.

Coagulant Effect:

S I NO	ENZYMES	ACTIONS
1	Acetylcholine Esterase	Catalysis and hydrolysis of acetylcholine
2	Arginine ester hydrolase	Bradykinin release,interference with clotting
3	Hyaluronidase A [59]	Reduction of collagen viscosity
4	Phospholipase A	Uncoupling of oxidative phosphorylation
5	Phospholipase B	Hydrolysis of lysophosphatides
6	Phosphodiesterase	Inhibition of DNA,RNA arabinose derivatives
7	5' nucleotidase	Specific Hydrolysis of PO_4 Mono esterase which links with 5'position of DNA, RNA
8	L- amino acid oxidase	Catalysis of amino acid
9	Thrombin like enzymes	Depression of fibrinogen level
10	Proteolytic enzymes	Tissue destruction and bleeding
11	Collagenase	Collagen digestion

Coagulant effect:

It has anti coagulant effect due to proteolytic disintegration of Fibrinogen. It had coagulant effect by converting Prothrombin into Thrombin.

Non Enzymatic Components:

Haemorrhagins (HR-I, HR-II) – has direct action on endothelium with procoagulant and anticoagulant effects. It causes rapid haemorrhage, haemorrhages into visceral organs, vasoconstriction followed by vasodilatation of microvessels, haemorrhages into capillary bed and endothelial destruction.[59]

CLINICAL FEATURES

The clinical features of snake bite can be considered under the following three headings:-

1. Local effects.
2. Systemic effects
3. Complications.

1. Local effects:

The limb bitten by the snake shows increased vascular permeability leading to swelling & bruising. Factors responsible include proteases, phospholipases, hyaluronidase and endogenous autocoids released by the snake venom like histamine and kinin. Venoms of some vipers cause a

diffuse increase in vascular permeability causing pulmonary edema.[30]. Local tissue necrosis occurs as a result of the direct action of myotoxic and cytotoxic factors, ischaemia due to thrombosis, external compression by tight tourniquets or swollen muscles[30]. Regional tender lymphadenitis is an important clinical sign, occurring early, and is toxin mediated. Local swelling is a valuable sign of viper bite to the extent that its absence excludes viper bite . Local swelling occurs rarely with the Asian cobra bite, but is not seen with Krait or sea – snake bites [31].

2. Systemic features

Fear and emotional reactions : Whether the snake is poisonous or non poisonous, fright is a common symptom. Patient may appear semiconscious with cold, clammy skin, feeble pulse and rapid shallow breathing.[31]

Bleeding and clotting disturbances: These are commonly seen after viper bites. This is due to procoagulant activity leading to consumption coagulopathy, anticoagulant activity inhibiting coagulation factors or due to thromobocytopenia.[30]. In the absence of trauma these generally donot causes spontaneous bleeding. If it occurs it is usually attributed to direct actions of haemorrhagic toxins.[30]. Commonest haemorrhagic manifestation seen in a study done by virmani and dutt in Jammu was haematuria ,while for Reid it was hemoptysis [32,33]. Other common types

of bleeding include haemetemesis and bleeding from gums, injection sites, and nose [32] . Discoid ecchymoses have been noted by Reid in his studies [33]. A few Australian land snakes can cause haemolysis.[30]

Neurological disturbances: Neurotoxic polypeptides and phospholipases of snake venom cause paralysis by blocking transmission at neuromuscular junctions (post synaptic for krait and cobra, responds to neostigmine). [30],. This is characteristic of kraits, cobras and coral snakes. The early features would be prominent forehead wrinkles, then ptosis, external ophthalmoplegia and finally paralysis of bulbar muscle causing respiratory paralysis [30]. Some patients bitten by elapids or vipers are in a physiologically drowsy state in the absence of respiratory or circulatory failure probably due to release and binding of endogenous opiates.[30]

Rhabdomyolysis : Generalised rhabdomyolysis with release of myoglobulin, muscle enzymes and potassium causes respiratory failure, hyperkalemia and occasionally renal failure (mainly seen in seasnakes). [30].

3. Complications

(i) Hypotension/shock:

The cause of shock following snake bite include

• Pain shock due to vasovagal mechanisms.

• Vasodilating autocoids and oligopeptides in viper venom inhibit the kininase enzyme leading to vasodilatation and shock

• Life – threatening anaphylactic reactions in previously sensitised individuals within minutes of being bitten.

• Hypovolemia from loss of blood and plasma into swollen limb or massive gastro intestinal hemorrhage.

• Direct myocardial action of toxin can contribute to hypotension (cardiogenic shock).

• Pulmonary edema due to multiple effects (myocardial failure, increased permeability of pulmonary vessels) also contributes to shock.

ii. Renal Failure:

Ischemia (due to hypotension and DIC), nephrotoxic effect of venom, pigment nephropathy associated with rhabdomyolysis and intravascular haemolysis contribute to the development of acute tubular necrosis, bilateral cortical necrosis, and renal failure commonly seen with Russell viper.[34] It is the commonest cause of mortality in viper bite.[27]

iii. Gangrene/necrosis:

It is reported to be of high incidence in the United States of America and Japan following snake bite, but is rare in India.[27]

PRINCIPAL FEATURES OF ENVENOMATION BY DIFFERENT FAMILIES OF SNAKES

• **E**lapidae (krait / cobra) - principal manifestation is neurotoxicity. Local blisters and necrosis can occur. Australian Elapides cause bleeding manifestation.[30]

• **V**iperidae (Russell viper / Saw scaled viper) - local swelling, cellulitis, regional lymphadenitis and bleeding manifestations.[30]

• **H**yperphiidae (sea snake) – Rhabdomyolysis .[30]

• **C**olubridae : Bleeding manifestation and renal failure.[30]

INVESTIGATIONS IN A CASE OF SNAKE BITE

1. Clotting Time: Incoagulable blood is a cardinal sign of systemic envenomation by majority of vipers. For clinical purposes a simple all or nothing test of blood coagulablity is adequate[30]. A few milliliters of blood taken by venepuncture are placed in a clean dry test tube[30]. More sensitive tests like prothrombin time and Fibrin degradation products are not used routinely and are indicated only in special situations.[30] Though snake bite is associated with thrombocytopenia, platelet count is not routinely needed until patient develops bleeding.

2. Blood Urea , Serum Creatinine and Electrolytes are indicated to detect development of Renal failure.[30]

3.Urine Examination for red blood cells.(30).

4.White Blood cell count – Leucocytosis above 20,000 indicates severe envenomation

5.Packed cell volume is done if patient develops bleeding.

6.Additional Investigations: Done only in specific conditions.

- Rhabdomyolysis (Sea Snake) – Rise in myoglobulin and creatine phosphokinase.
- Renal failure – PH, PCo2, Bicarbonate estimation,Urine Sodium
- Shock (Cardiotoxin) – Electrocardiogram.
- Pulmonary Edema – Chest X-ray.

IMMUNO DIAGNOSIS

Enzyme linked immunosorbent assay is a very important tool for studying both the epidemiological and clinical effects of snake bite in humans. In places where specific anti snake venom is available against each species, if the snake is not brought along with the victim for identification, immuno detection of specific snake venom antigen in body fluids of the patient will help in management [12] . It has been proved by ELISA that effects of envenomation depend upon hours (i.e, Blood venom level X Time elapsed between bite and institution of treatment) rather than blood level of venom.(35). Immunodiagnosis kits are unlikely to be of practical help unless their present cost is substantially reduced and

speed of diagnosis is increased [36]. Studies in Liverpool are in progress to increase the rapidity of assay to provide specific diagnosis within 10 minutes of sampling [34].. ELISA by detection of snake venom antibody can be used for retrospective diagnosis of envenoming in epidemiological studies[36]

GRADING

Grading of the effects of viper bite has been done by different authors in varying patterns. The grading used by Reid in his study included both local and systemic effects in grading bites as those with nil, mild, moderate and severe envenomation[32]. In an Indian study this grading system was found to be complex and not very useful.

A much simpler manner of grading would be:-

Nil	No local cellulitis \ lymphadenitis ; CT normal
Grade I	local cellulitis + regional adenitis; CT normal
Grade II	CT prolonged +/- local signs
Grade III	CT prolonged + systemic features like bleeding and shock[37].

MANAGEMENT

General Measures:

• Reassure the victim

• Immobilize the bitten limb using a splint or sling

• Cauterization, incision and drainage, amputation, usage of venom pumps, instillation of chemical compounds and electric shock locally are all to be avoided as these will cause uncontrolled bleeding from the site and damage of nerves and vessels, leading to necrosis.[30]

• Use of tourniquets are controversial, dangers of their application include ischemia and gangrene, damage to peripheral nerves and increased local effect of venom. But in case of cobra or sea snake if medical therapy is likely to be delayed a firm crepe bandage can be applied.

• Inj. Tetanus toxoid should be given.

Specific therapy:

ANTISNAKE VENOM THERAPY

INDICATIONS:

Distinction of poisonous from non-poisonous snake is often difficult, and is not usually important for the clinician. It is known that about 15 drops of viper venom can be fatal to an adult and 3 drops of cobra venom could be lethal, and that one drop of sea snake could kill 5

men. Fortunately snake bite is a defensive reaction which rarely results in much venom being injected. Following poisonous snake bite more than half of victims will have minimal or no poisoning. Hence poisonous snake bite is not synonymous with snake bite poisoning. So even though the snake is identified as poisonous, or there are bite marks, treatment should be given only if there are signs of envenomation. Antisnake venom itself can be fatal and it is a costly drug with limited supply.[31]

CLINICAL INDICATIONS

- Hemostatic abnormalities
- Neurotoxicity
- Generalized rhabdomyolysis
- Definite evidence of local envenomation.

CONTRAINDICATIONS:

There is no definite contraindication as Anti snake venom is the only specific therapy for snake bite. Atopic patients and those who had reaction to equine antiserum on previous occasions have an increased risk of developing severe antivenom reactions. It can be ameliorated by pre-treatment with adrenaline, anti-histamine and corticosteroid.[30]

TYPES OF ANTI SNAKE VENOM:

Mono – specific forms are more effective and less likely to cause reactions than polyspecific antivenom. In most developing countries only a single polyspecific antivenom is available [36]. In India ASV is produced by Haffkin Institute, Bombay, and Central Research Institute, Kasauli. It is produced by hyperimmunizing horses against the common four poisionous snake (Cobra, Krait, Russell's and Saw scaled viper). [38]

DOSE OF ANTI- VENOM:

The dose schedule for polyvalent and monovalent antisnake venom varies. We know the lethal dose of Cobra is 0.12g, Krait – 0.06g, Russell viper – 0.15g, Echis carinatus- 0.08g.

Poly valent anti- snake venom 1 ml neutratilses 0.6mg of cobra venom, 0.45mg of Krait, 0.6mg Russell viper and 0.45mg of Saw Scaled viper venom. Based on this if the poisonous snake is known , dose of anti snake venom can be estimated theoretically. But practically it is not applicable as amount of venom injected in each patient and by each bite varies. And in vitro studies do not correlate with in vivo results. Based on the results of a number of studies the dose of anti snake venom conventionally recommended as initial dose if snake is known is

- Common krait – 100ml of Haffkine polyspecific antivenom.
- Russell viper -100ml
- Indian Cobra -100ml and
- Echis Carinatus -100ml[30].

If the snake is not known the recommended amount of anti snake venom given based on clinical signs is 50ml, 100ml, and 150ml for grades I to III. For patients presenting with neurotoxic features initial dose of ASV given is 100ml.[37]

The apparent serum half-life of antisnake venom in envenomated patients ranges from 26 to 95 hours depending on how they are prepared[30] .Though it clears the venom from the circulation immediately, the clinical effect on clotting restoration occurs usually after four hours. Thus if dose has been adequate clotting time should be normal by 6 hrs[30,39]. Neurotoxic signs improve within 30 mins but may take several hours. A second dose is given if neurological features persist for more than 30 minutes. Dose of ASV is the same for adults and children.[30]

There is controversy about how long after envenomation anti – venom therapy is still effective. Carrison et al claim that it is most useful if given within 4hrs, less if delayed for 8 hrs, and doubtful if given after

24hrs [17] .However, Dwivedi et al have reported therapy with anti snake venom to be beneficial even after 8 days and states that there is no fixed time limit.(40)

MODE OF ADMINISTRATION:

Local Injection: If it were possible to inject anti-venom locally at the site of bite within a few minutes, necrosis might well be prevented. But in practice this is virtually never possible and therefore is not advocated.(31)

Intravenous injection: It is the most effective route. An infusion of anti-snake venom mixed with isotonic fluid is given in 1:3 dilution. It is given over 30-60 minutes, initially starting with 10-15 dps/mt and then increasing the dose (30). ASV can also be given direct intravenous bolus. It was found there is no difference in reaction between the two methods.(41)

ANTIVENOM REACTIONS AND TESTDOSE

Anti snake venom therapy is complicated by 3 types of reaction.

1. Early (Anaphylactic), 2. Pyrogenic, 3. Late Serum sickness type reaction. Early anaphylactic reaction was initially thought to be IgE mediated. However, in most there is no prior exposure to serum. Skin test dose reactions do not correlate with the incidence of reactions occurring during ASV administration.(30,41) Complement activation is also

implicated, but not proved.[19] Clinical features include itching, utricaria, fever, tachycardia, palpitations, nausea, and vomiting. Early reactions are managed by 0.5ml of 0.1% adrenaline sub cutaneous and chlorpherniramine maleate 10mgIV.[4]. Pyrogenic reactions results from contamination of anti- snake venom with endotoxin like compounds. High fever occurs which is treated with paracetomol. Late serum sickness reaction develops 5-24 days later,characterized by fever, itching, urticaria, arthralgia and lymphadenopathy, and is treated with chlorpheneramine 2mg four times daily or prednisolone 5 mg four times daily for 5 days.[30].The role of the intra dermal test with 0.2ml of ASV, though widely followed, is controversial. According to some authors, this test only delays the onset of definite therapy and has no role in the prediction of early or late Anti- snake venom reactions.[30,41]

Other supportive measures

• Neurotoxic effects – Artificial Ventilation.

Intravenous neostigmine 0.5mg given at half hourly interval

for five injections. This is followed by same dose at increasing intervals of 2 to 12 hours according to neurological recovery. Each dose of neostigmine is preceeded by 0.6g atropine [6] . Shock- Plasma Expanders, Dopamine infusion, Steriods are used.[30]

- **Renal Failure** – During initial oliguric phase (less than 400ml/24hrs)dopamine infusion at the rate of 2.5 microgm/kg/minute or diuretics are used. In established renal failure, dialysis is indicated.[30].
- **Local infection:** Intra compartmental syndrome – broad spectrum antibiotics are used. Blisters are best left undisturbed. Slough should be excised. Swelling of muscles within tight fascial compartments may raise the tissue pressure leading to impaired perfusion and ischemia. In these circumstances fasciotomy is indicated. It should be done only after blood coagulopathy has been treated.

- **Steroids** are advocated in both patients presenting with bleeding tendencies with neurological manifestations (Hydrocortisone 50 to 100mg I.V 8th hrly). However, its use remains controversial .[42]

- **Heparin :** Some studies show that if heparin 10,000 units is given intra venously stat followed by 5000 units 8th hrly IV and continued for 48 hrs it is useful in the prevention of DIC.[21] Yet, other studies have shown it to be ineffective and worsening bleeding.[36].
- **Fibrinogen** infusions are not helpful.[36]
- **Blood Transfusion:** Helps in viper bite shock secondary to bleeding and also helps in the management if specific antivenom is not available.

MATERIALS AND METHODS

MATERIALS AND METHODS

Study type : Descriptive study

Population : Patients with definite history of snake bite envenomation

Setting : Intensive medical care unit Coimbatore medical college

Duration: September 2009 to May 2010

Inclusion criteria :

Patient admitted in intensive care unit with definite history of snake bite or with signs of envenomation and not having any of the exclusion criteria

Exclusion criteria:

Patients admitted with unknown bite, or with history of bite by non poisonous snakes or with no signs of envenomation.

Methodology:

200 patients with definite history of snake bites or with definite features of envenomation as evidenced by cellulitis, bleeding manifestation, neurotoxicity or prolonged clotting time enroll for study.

History included regarding application of tourniquet ,type of snake, time interval between bite and treatment in previously treated hospital and regarding native treatment . History elicitation also regarding various symptomatology. Detailed clinical examination of the patient will be done.

CLINICAL EXAMINATION

LOCAL EXAMINATION

Site of snake bite for the presence of cellulitis presence of ,fang marks, bleeding from the site of bite, local necrosis and gangrene.

GENERAL EXAMINATION

Pulse ,blood pressure, respiratory rate will be noted and will look for haemorrhage , ecchymosis, bleeding from puncture site, local lymph node enlargement, and periorbital oedema .Also ptosis and extra ocular movements are examined for.Examination of the cardiovascular system,respiratory system,abdomen and central nervous system will be followed.

Lab investigation include

1 Coagulation profile

Clotting time

Bleeding time

Haemoglobin

Total count

Differential count

Prothrombin time

Activated partial thromboplastin time

Platelet count

2 Liver function test

Serum bilirubin

SGOT

SGPT

Alkaline phosphatase

Total protein

Albumin

Globulin

3 Serum cholesterol

4 Serum uric acid

5 Serum calcium

6 Renal parameters

Blood urea

Serum creatinine

Urine analysis

Albumin

Sugar

Red blood cell count

White blood cell count

Deposits

7 ECG

The patient will be followed up in the ward until discharge and details regarding the complications developed will be noted.

ROUTINE TREATMENT GIVEN IN OUR HOSPITAL

1.Tetanus toxoid 0.5ml IM on admission.

2. If signs of envenomation present polyvalent antisnakevenom is given

3. Antibiotics - Penicillin, Metronidazole given parenterally ,dose according to body weight .Higher antibiotics like Ciprofloxacin ,Cefotaxime when patient become febrile or develop septicemia.

4.parameters like clotting time,worsening of renal failure,watched and if no improvement occurs ASV repeated as 50-100 ml each time until parameters are normalize.

5. Urinary output is monitored and renal parameters watched regularly .Fluid and electrolyte balance maintained. Peritoneal dialysis, mostly and hemodialysis rarely done when required based on the indication.

6. Injection heparin not used.

7.Blood transfusion and dopamine administered when patients are in shock.

8. Anti inflammatory drugs and wound care given accordingly.

9. ASV allergy is treated with injection AVIL and intravenous Dexamethasone 0.8mg and injection Adrenaline. Dosage repeated if

no significant improvement takes place .ASV drip restarted slowly and carefully and reaction watched.

ASV available in Coimbatore medical college hospital is polyvalent .Each 1 ml neutralizes,

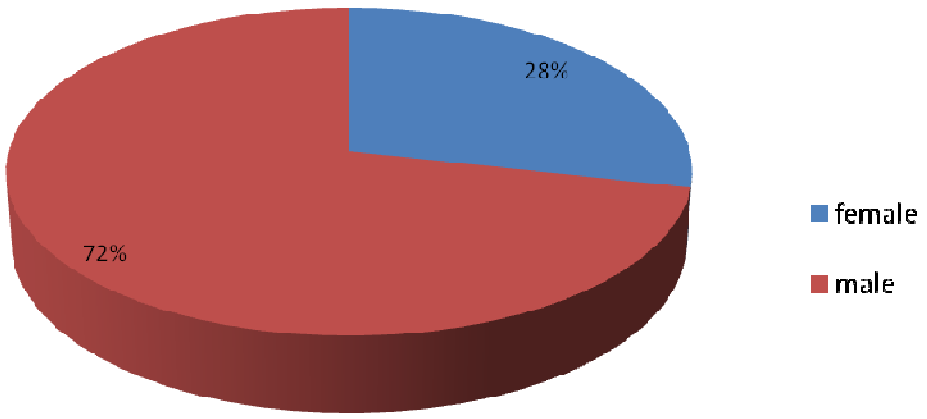
- 0.6mg of dried cobra venom
- 0.45 mg of dried krait venom
- 0.6mg of Russel viper dried venom
- 0.45 mg of dried saw scaled viper venom

RESULTS AND ANALYSIS

RESULTS OF THE STUDY

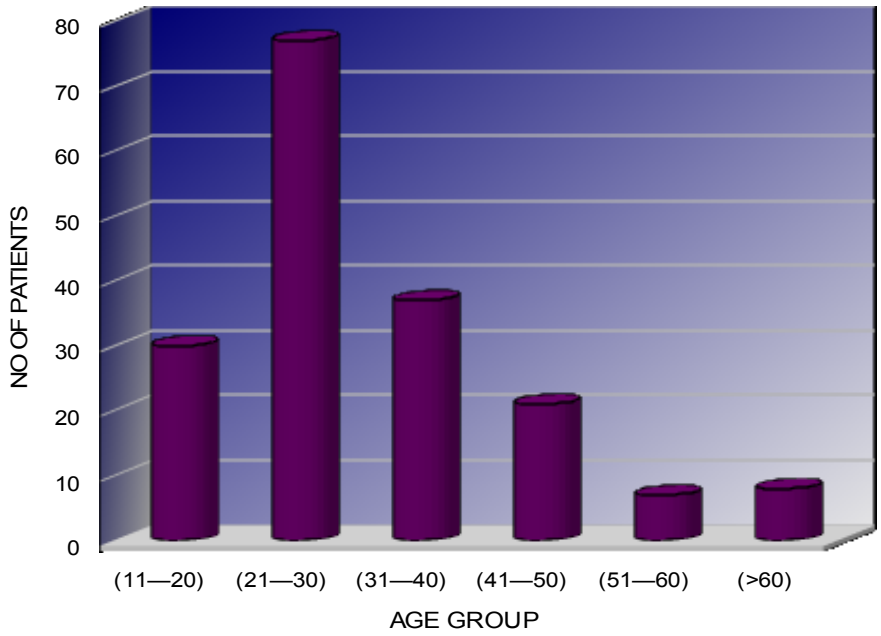
Total no of patients -200

Gender	No of Cases	Percentage
No of males	144	72%
No of females	56	28%



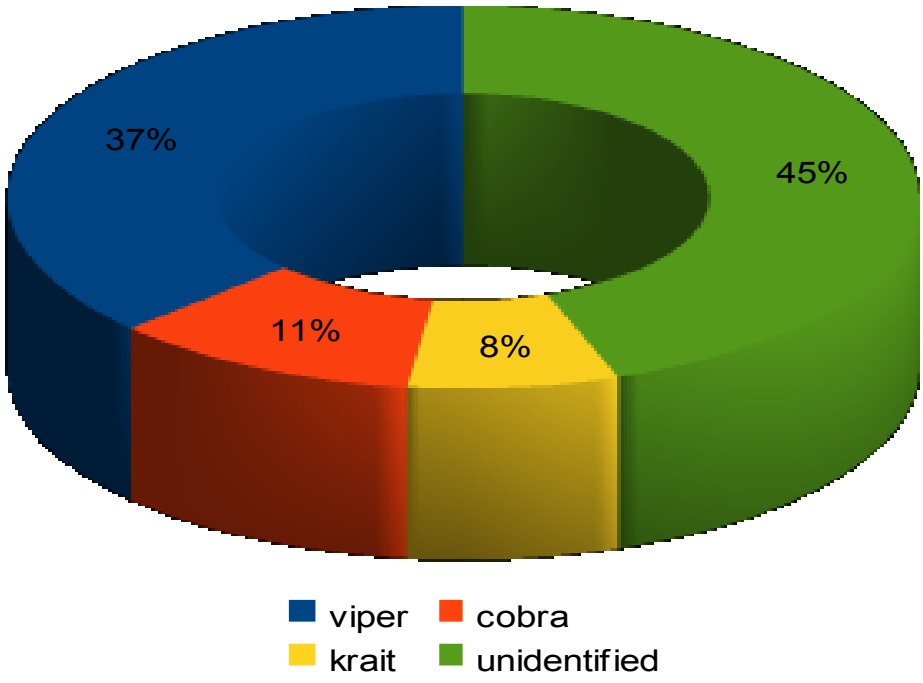
AGE DISTRIBUTION

Age Group	No. of Cases	Percentage
11-20	30	19.5%
21-30	77	38.5%
31-40	37	19%
41-50	21	10.5%
51-60	18	9%
>60	7	3.5%



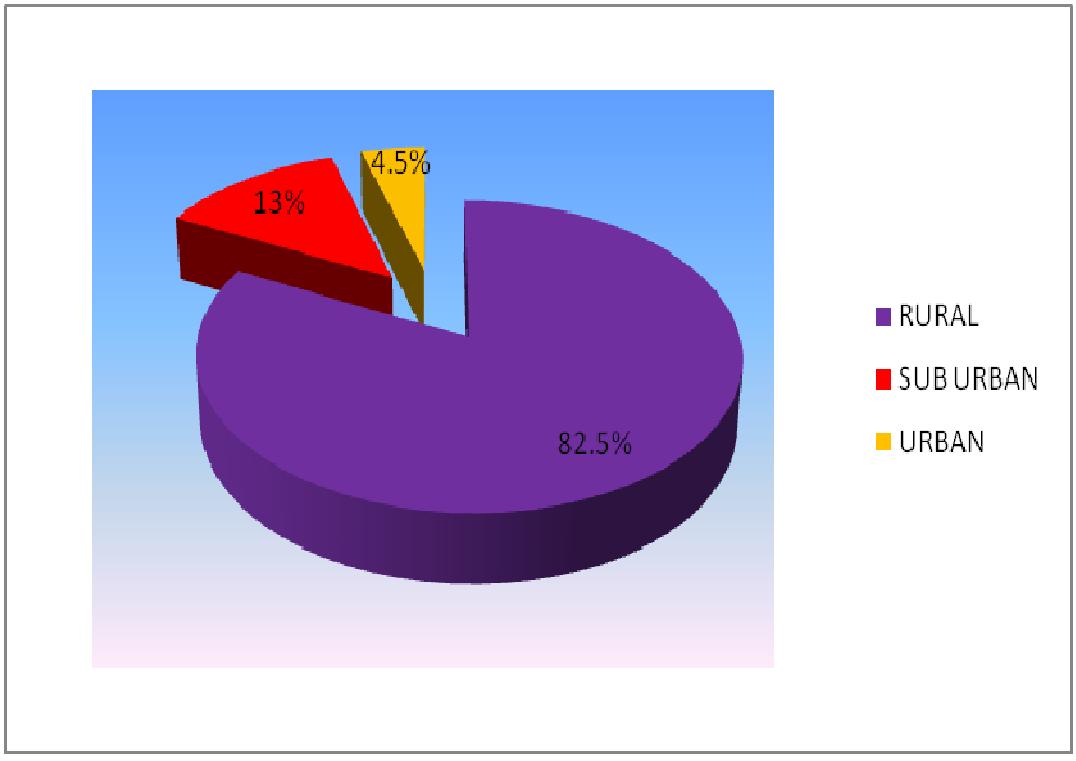
TYPES OF SNAKES

Type of snakes	No of patients	Percentage
Viper	74	37%
Cobra	22	11%
Krait	15	7.5%
Unidentified	89	44.5%



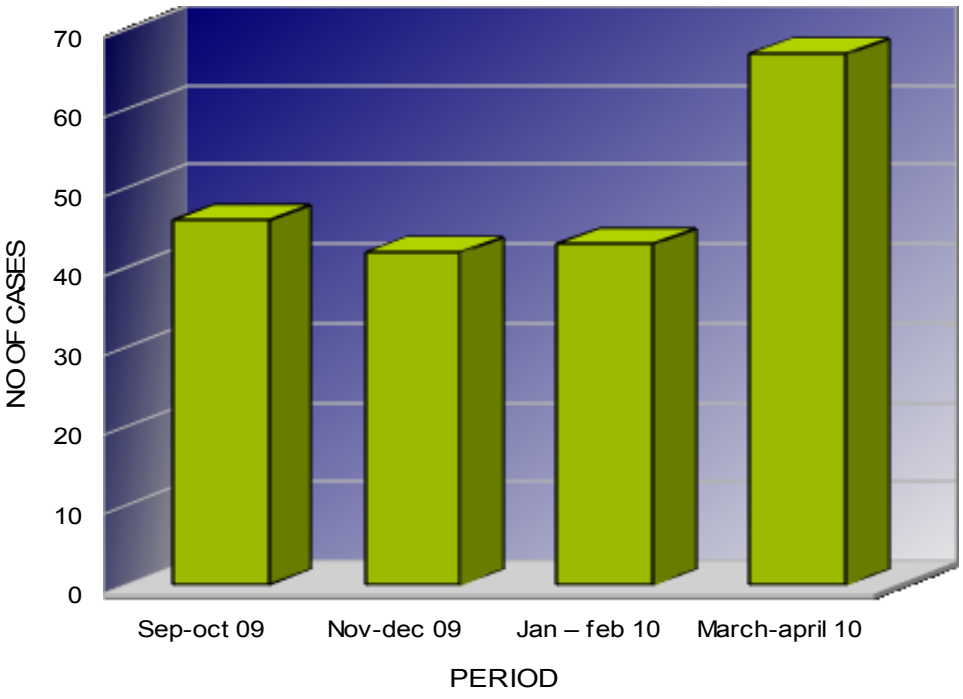
AREA DISTRIBUTION

AREA	NO OF CASES	PERCENTAGE
RURAL	165	82.5%
SEMI URBAN	26	13%
URBAN	9	4.5%



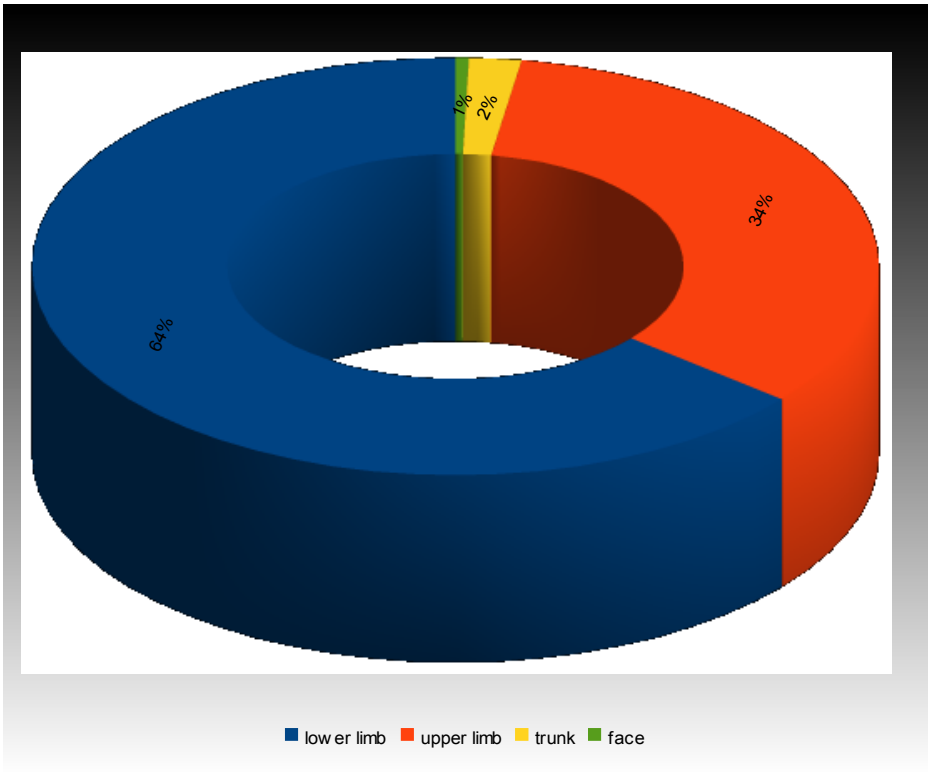
SEASONAL VARIATION IN ADMISSION

Period	No of cases	Percentage
Sep-October	46	23%
Nov –Dec	42	21%
Jan-Feb	41	20.5%
March-April	67	33.5%



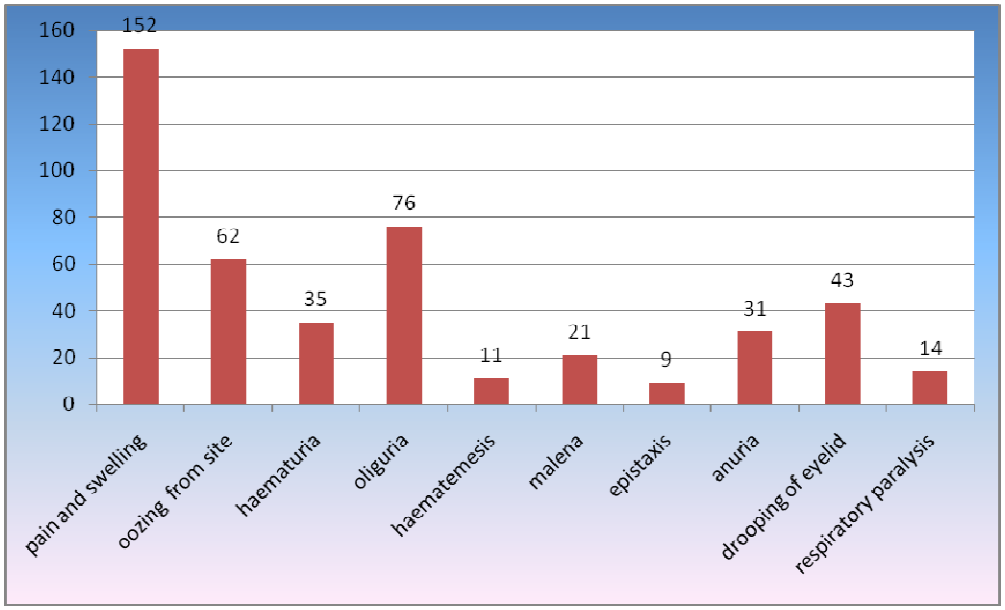
SITE OF BITE

SITE OF BITE	NO OF PATIENTS	PERCENTAGE
Lower limb	128	64%
Upper limb	67	33.5%
Trunk	4	2%
Face	1	0.5%



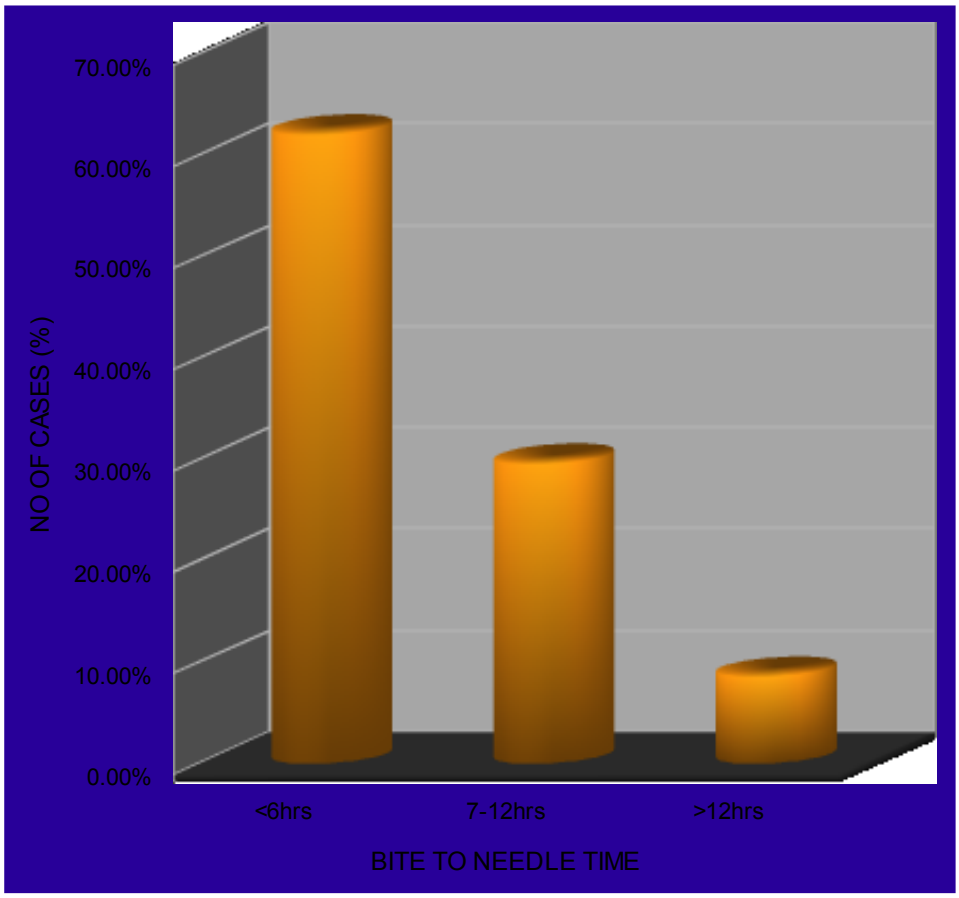
CLINICAL PROFILE OF SNAKE BITE ENVENOMATION

Manifestation	No of cases	Percentage
Pain and swelling	152	76%
Oozing from site	62	31%
Haematuria	35	17.5%
Oliguria	76	38%
Haematemesis	11	5.5%
Malena	21	10.5%
Epistaxis	9	4.5%
Drooping of eyelid	43	21.5%
Respiratory paralysis	14	7%



TIME BETWEEN BITE AND ASV ADMINISTRATION

Bite to needle time	No .of cases	Percentage
<6hrs	124	62%
7-12hrs	59	29.5%
>12hrs	17	8.5%



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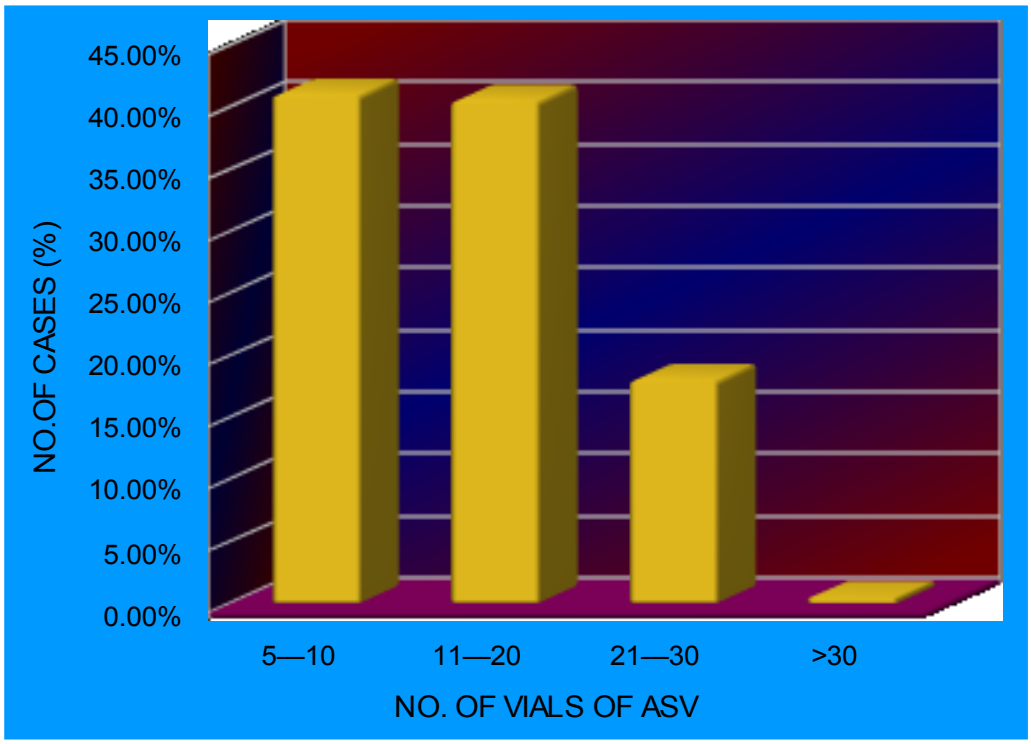
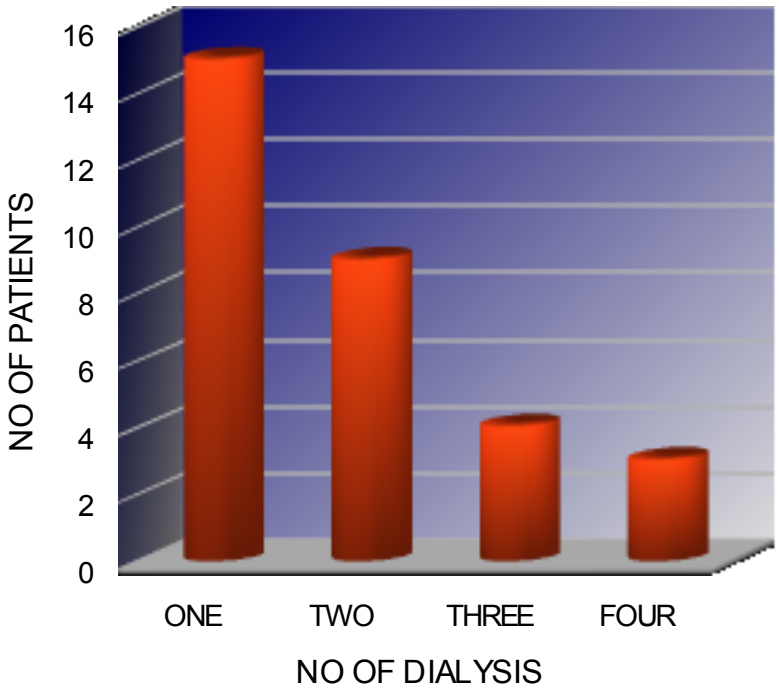
TOTAL NO OF ASV GIVEN

TOTAL VIALS OF ASV GIVEN	NO OF CASES	PERCENTAGE
5-10	82	41%
11-20	81	40.5%
21-30	36	18%
> 30	1	0.5%



NUMBER OF DIALYSIS

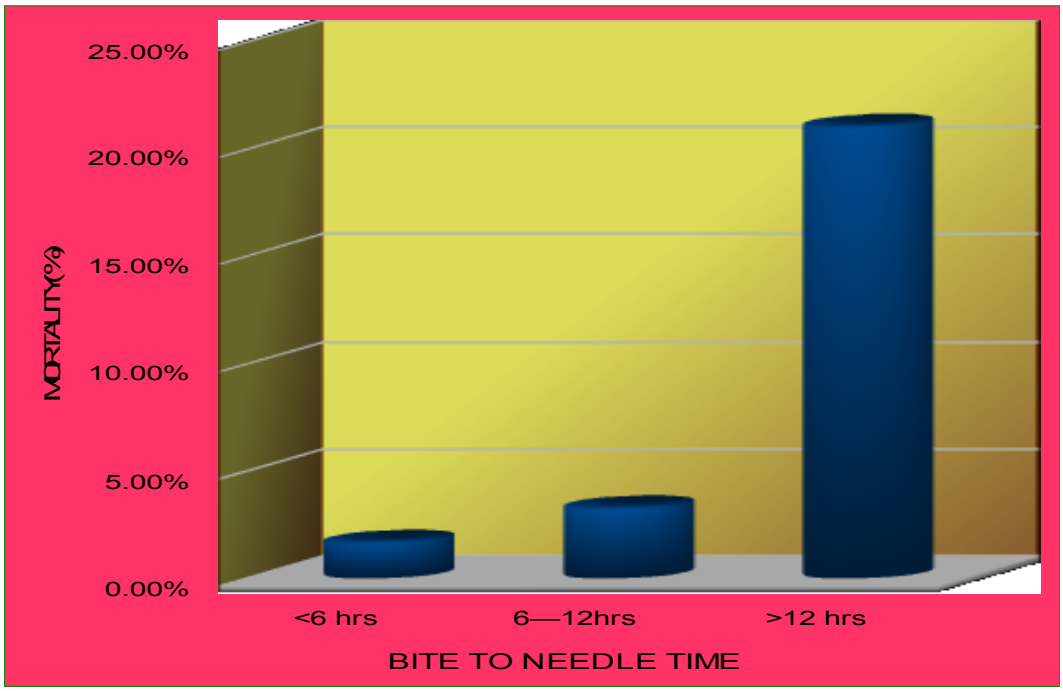
NO.OF DIALYSIS	NO.OF CASES
ONE	15
TWO	9
THREE	4
FOUR	3



DATA OF EXPIRED PATEINTS

	1	2	3	4	5	6	7	8	9
Sex	**M**	**M**	**F**	**M**	**F**	**M**	**M**	**M**	**M**
Age	**27**	**19**	**37**	**29**	**31**	**57**	**54**		**23**
Time delay in hospitalization(hrs)	**5**	**5**	**16**	**24**	**12**	**6**	**24**	**16**	**6**
No.of vials of ASV received before admission	**5**	**3**	**10**	**0**	**5**	**3**	**6**	**5**	**4**
Total asv given	**30**	**25**	**30**	**25**	**30**	**23**	**31**	**27**	**24**
hypotension	+	–	+	+	+	+	+	–	+
Subconjunctival hemorrhage	+	+	–	+	–	+	–	+	+
ptosis	–	–	+	–	–	–	+	–	–
Day of death after snake bite	**7**	**6**	**5**	**5**	**7**	**9**	**3**	**8**	**9**

BITE TO NEEDLE TIME AND MORTALITY



		OC	TBAB (Hr)
OC	Pearson Correlation	1	.723**
	Sig. (2-tailed)		.000
	N	200	200
TBAB (Hr)	Pearson Correlation	.723**	1
	Sig. (2-tailed)	.000	
	N	200	200

**. Correlation is significant at the 0.01 level (2-tailed)

The coefficient of correlation, between outcome and time between ASV administration and snake bite is 0.723.means that earlier the arrival better the prognosis .

SUB CONJUNCTIVAL HAEMORRHAGE AND POOR OUTCOME

Crosstab

			OC		
			Alive	Death	Total
SCH	No	Count	183	4	187
		% within SCH	97.9%	2.1%	100.0%
		% within OC	96.3%	40.0%	93.5%
	Yes	Count	7	6	13
		% within SCH	53.8%	46.2%	100.0%
		% within OC	3.7%	60.0%	6.5%
Total		Count	190	10	200
		% within SCH	95.0%	5.0%	100.0%
		% within OC	100.0%	100.0%	100.0%

From the above table chi square value of 49.575 for the association between subconjunctival haemorrhage and the poor outcome is highly significant. ($p < .005$).

ANURIA AND OUTCOME

Crosstab

			OC		
			Alive	Death	Total
ANU	No	Count	167	2	169
		% within ANU	98.8%	1.2%	100.0%
		% within OC	87.9%	20.0%	84.5%
	Yes	Count	23	8	31
		% within ANU	74.2%	25.8%	100.0%
		% within OC	12.1%	80.0%	15.5%
Total		Count	190	10	200
		% within ANU	95.0%	5.0%	100.0%
		% within OC	100.0%	100.0%	100.0%

From the above table chisquare value 33.45 for the association between anuria and poor outcome is highly significant.($p<.001$).

DISCUSSION

DISCUSSION

It is noted that only 35% snake bite cases seek medical attention. Even in this there is higher incidence of male population. This may be either due to real increase in incidence of snake bite in males or due to female patients seeking native treatment or attending local hospitals due to neglect or indifference. The age distribution pattern shows more young people are the victims (144 of them from 11-40 years). Tourniquet application rate is 30% in our study.

Majority of patients are from rural area (62.5%) and from urban area contribute about (4.5%).

Though most of our patients (62%) sought medical attention within 6 hours after a snake bite, which is quite encouraging, administration of inadequate dosage of ASV (4 of our 10 patients expired due to snake bite envenomation. They had received 5 vials or less of ASV outside our hospital and didn't have the advantage of early admission.)

This emphasizes the statement of Dr .David et al about the efficacy of early administration of ADEQUATE Antisnake venom in snake bite envenomation.

We have used the photos of common snakes in our area which helped identification of snake very easy for the patient and attenders, inspite of that about 89 of the 200 snakes were un identified ,either

because of nocturnal bite or patient was panicky to identify. So it tells us that using monovalent antisnake venom in our community will take a few more years to get recognized.This also denied us of knowing the common snakes of this region and snakes producing both haematological and neurotoxicity which might be of important for therapy. Since 151 patient had haematological toxicity alone ,viperidae may be common species here.

Our study shows a higher incidence of haematuria among patients with haematological manifestations where a study by Banerjee et al at Safdarjang hospital also supports the same.

In our study we noticed that 21 of our patient with haematological toxicity did not have cellulitis. 17 of them were admitted within 6 hours after bite. This may be due to delayed systemic absorption of venom, less local effect of venom ,or early neutralization of venom by ASV (Jacob et al).

Another factor observed was 21 patients among 151 haematological toxicity cases ,had an initial normal clotting time on admission and which increased later after few hours.This may be explained by [(1)] the efficacy of tourniquet .(15 out of 21 patient had applied tourniquet and release of tourniquet might have caused systemic toxicity.[(2)] Slower absorption of venom into circulation due to the large molecular weight haemotoxic

substances. This fact necessitates frequent estimation of clotting time if normal initially.

In our study 36 patients had renal impairement.clinically , biochemically or both. 7 out of them managed conservatively.29 patients underwent dialysis.

In our study septicemia developed in 14 patients and 8 patients only survived.

In our study renal failure and septicemia were the common cause of death.

In our study 43 (21.5%) developed drooping of eye lids .14 (7%) patients developed respiratory paralysis .Out of 14 patients supported with mechanical ventilator only two patient died.

Jacob et al reports that only 2% of their patient required blood transfusion in our study 12% patient required blood transfusion.

It is difficult to fix the ASV requirements on admission and it has to be given as per the individuals response to prior ASV and assessed with clotting time and other parameters. With adequate ASV ,the clotting time normalize in 6 hrs.

In our study 82 patients received 5-10 vials of ASV and 81 received 11-20 vials and 36 patients received 20-30 vials and only one patient received more than 30 vials.

Regarding time delay in starting ASV , 124 patients received ASV within 6 hrs of bite and 59 patients received between 7-12 hrs and 17 patient received after 12 hrs of bite. Because most of the patients received ASV in time, mortality was as less as 5% in our study but still a portion of patients who received ASV after a delay and those who received in time outside the institution, which was inadequate had a relatively more mortality and morbidity.

Even though complications developed in patients receiving the treatment within 6 hours , these complications like renal failure are usually reversible and the mortaliry is 1.6% only. For those who received ASV in 6-12 hours mortality was 3.3%.but for those who received ASV after12hours had a mortality of 21 %.

SUMMARY AND CONCLUSIONS

SUMMARY AND CONCLUSION

In our study:

1 . Males were commonly affected. Seasonal variation was present in snake bite .Incidence and mortality were more during March - April. Most of the cases of the snake bite are from rural area.

2. The clinical profile of our study is more hematological toxicity,62% seek medical advice within 6 hours of bite.Lower extremity is the common area of bite.

3. Of the identified snakes ,Viper was the commonest and because of high incidence of haematological toxicity alone viperidae may be common species here. Viper bite was the commonest cause of renal failure in snake bite.

4. Hypotension, conjunctival haemorrhage,anuria during presentation were associated wth increased mortality.

5. Mortality was less in patients who came within 6 hours and least in patient who had received 10 vials of ASV within 6 hours .

6. Neuroparalysis, hypotension,subconjunctival haemorrhage necessitates administration of more than 20 vials.

7. Mortality in our study was 5%.

8. Commonest cause of death are septicemia, renal failure, and coagulation abnormalities.

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BIBLIOGRAPHY

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ANNEXURE

ANNEXURE I

CERTIFICATE OF CONSENT

I have been invited to participate in research on snake bite envenomation. I understand that it will involve answering a detailed questionnaire, undergoing a thorough physical exam, giving blood and urine samples .I have been informed that the risks are minimal and may include only slight pain and redness at sight of needle prick. I am aware that there may be no benefit to me personally and that I will not be compensated monetarily. I have been provided with the name of a researcher who can be easily contacted using the number and address I was given for that person.. I have had the opportunity to ask questions about it and any questions I have asked have been answered to my satisfaction. I consent voluntarily to participate as a participant in this research and understand that I have the right to withdraw from the research at anytime without in anyway affecting my medical care.

Name of the participant: _____

Signature of the participant: _____

Date: _____
(DD/MM/YY)

If illiterate, a witness must sign (if possible, this person should be selected by the participant and must have no connection to the research team).

I have witnessed the accurate reading of the consent form to the potential participant, translated to his/ her mother tongue , and the individual has had opportunity to ask questions. I confirm that the individual has given the consent freely.

Name of the witness

Signature of the witness;

Date;

Thumb print of participant

I have accurately read or witnessed the accurate reading of the consent form to the potential participant, I confirm that the individual has given the consent freely.

Name of the researcher;

Signature of the researcher with date;

PROFORMA

(Part I: Details to be filled in at IMCU before transfer to the ward)

Name: _____Age:_____ Sex:_____ IP NO:_____

Address

District:_____Taluk:_____Village_____ _____

Occupation: _____ Contact telephone _____.

Admitting unit:___ Time of bite(am/pm):___ Place □ In And Around House □ Field

Type of snake: □ identified □ not identified if identified specify;_____

Site of bite □upper limb □ lower limb □trunk □Head

First aid given (□ yes□ no) if yes □Tourniquet □incising wound □substances applied on wound □others

Any alternative medicine given □yes □ no if yes specify_____

<u>Symptoms and signs</u>

LOCAL

SYSTEMIC

□Fang marks
□Oozing
□Cellulitis
□Blisters
□Skin changes

□Diplopia
□Lymph nodes
□Ophathalmoplegia
□Others

FUNDUS **Hematologic**

Neurologic □Bleeding
□Ptosis □Hematuria

Clotting time :_____ **ASV given** □yes □ no No of vials _____

Reaction to ASV: □NIL, □Mild(pruritus,nausea,vomiting) ,□Severe (respdistress, hypotension)

Time delay between bite and ASV:_____

Complications : □Shock (sbp <90) □Stroke □Compartment syndrome
□Gangrene □Respiratory paralysis delayed
□ Others specify _____

Transfusions given □ Yes □ No if yes give details below

Component	No of packs

Part II: Details to be filled in the medical ward at discharge

(kindly go through the details filled above and correct if necessary)

Duration of hospital stay: Total_____ IMCU:_____ Ward:_____

Investigations

	Date of investigaiton			
Investigation				
Hemoglobin				
Total count				

Diff count				
ESR				
Platelets				
Hematocrit				
Blood urea				
Sr creatinine				
Sr Na				
Sr K				
Urine alb				
Urine deposits				
Urine bile pigments				
Urine sugar				
AST				
ALT				
ALP				
S. Bilirubin				
Prothrombin time*				
FDP*				

(* if the patient has bleeding tendency)

Kindly enter the complication developed in the ward in Part I of this proforma

ECG :
DATE OF DISCHARGE:
CONDITION ON DISCHARGE :

ABBREVIATIONS

AKI – Acute Kidney Injury

IMCU – Intensive Medical Care Unit

UP – Uttar Pradesh

BP – Blood Pressure

PR – Pulse Rate

HR – Haemorrhagin

DIC – Disseminated Intravascular Coagulation

MAHA – Micro Angiopathic Hemolytic Anemia

RVV – Russells' Viper Venom

ARF – Acute Renal Failure

LDH – Lactate De Hydrogenase

CaCl2 – Calcium Chloride

CPK – Creatinine Phospho Kinase

CK – Congested Kidney

ABG – Arterial Blood Gas

ASV – Anti Snake Venom

AV block – Atrio Ventricular Block

DNA – Deoxy Ribo Nucleic Acid

WBCT – Whole Blood Clotting Time

FDP – Fibrin Degradation Product

ATN – Acute Tubular Necrosis

MOA - mechanism of action

TOS - Type of snake

SOB - Site of bite

POS - pain or swelling

OFS - oozing from site

HU - haematuria

OLIG- oliguria

SCH - subconjunctival haemorrhage

MAL -malena

HE - hematemsis

ANU - anuria

BG - bleeding gums

DEL - drooping of eyelid

R.PAR -respiratory paralysis

RF - Renal failure

CTP - clotting time prolongation

TBAB- time between bite and ASV administration

NASV - number of ASV

ASVO - ASV given outside

TASV - Total ASV given

NOD - number of dialysis

HS - Hospital stay duration

OC - outcome

Master Chart

S.No	Sex	AGE	AREA	MOA	TOS	SOB	BP	PS	OFS	HU	OLIG	SCH	MAL	HE	ANU	BG	DEL	R.PAR	R F	CTP	TBAB(hi	NASV	ASVO	BT	TASV	NOD	HS	OC
1	m	19	U	sep	u	LL	130/80	y	n	n	n	n	n	n	n	n	n	n	n	y	3	10	0	N	10	0	3	D
2	m	27	SU	sep	v	LL	90/60	y	y	y	y	y	n	y	y	y	n	n	y	y	18	25	5	Y	30	3	7	E
3	m	17	SU	sep	v	LL	140/90	y	y	n	n	n	n	n	n	n	n	n	n	y	2	10	0	N	10	0	3	D
4	m	37	R	sep	v	LL	130/80	y	n	n	n	n	n	n	n	n	n	n	n	y	3	5	3	N	10	0	3	D
5	m	29	R	sep	u	UL	120/80	n	n	n	n	n	n	n	n	n	n	n	n	y	3	5	2	N	7	0	4	D
6	m	34	R	sep	u	LL	130/80	y	Y	n	Y	n	n	n	y	n	n	n	y	y	4	15	2	N	17	2	6	D
7	F	45	R	sep	u	UL	130/80	n	n	n	n	n	n	n	n	n	n	n	n	y	5	5	0	N	5	0	3	D
8	F	26	R	sep	v	UL	150/90	y	y	n	y	n	n	n	n	n	n	n	y	y	7	15	5	Y	20	0	4	D
9	M	59	U	sep	k	LL	130/80	n	n	n	n	n	n	n	n	n	y	n	n	n	5	10	2	N	12	0	3	D
10	M	39	R	sep	c	LL	120/70	n	n	n	n	n	n	n	n	n	y	y	n	n	5	20	5	Y	25	0	6	D
11	M	14	R	sep	v	LL	110/70	y	y	y	y	y	y	n	y	y	n	n	y	y	5	25	3	Y	28	4	6	E
12	M	56	SU	sep	v	LL	140/90	y	n	n	n	n	n	n	n	n	n	n	n	y	2	15	0	N	15	0	3	D
13	M	27	R	sep	u	LL	110/70	n	n	n	n	n	n	n	n	n	n	n	n	y	5	5	5	N	10	0	3	D
14	M	17	R	sep	u	LL	150/90	y	n	n	n	n	n	n	n	n	n	n	n	n	6	10	0	N	10	0	4	D
15	F	25	R	sep	k	LL	140/80	y	n	n	n	n	n	n	n	n	y	y	n	n	10	25	3	N	28	0	7	D
16	m	21	R	sep	v	LL	130/80	y	y	n	y	n	n	n	y	y	n	n	y	y	9	20	5	N	25	2	13	D
17	F	28	R	sep	u	LL	120/70	y	y	n	n	n	n	n	n	n	n	n	n	n	5	6	4	N	10	0	3	D
18	M	32	U	sep	u	LL	110/70	y	n	n	n	n	n	n	n	n	n	n	n	y	2	5	0	N	5	0	2	D
19	M	59	R	sep	u	LL	110/70	y	y	n	y	n	n	n	y	n	n	n	y	y	12	20	3	N	23	2	13	D
20	M	27	R	sep	u	LL	120/80	n	n	n	n	n	n	n	n	n	y	n	n	n	9	10	8	N	18	0	4	D
21	M	35	SU	oct	v	UL	120/70	y	n	n	n	n	y	n	n	n	n	n	n	y	8	8	0	N	8	0	3	D
22	M	52	R	oct	v	LL	160/90	y	n	n	n	n	n	n	n	n	n	n	n	y	4	7	2	N	9	0	3	D
23	M	29	R	oct	u	LL	110/70	n	n	n	n	n	n	n	n	n	n	n	n	y	4	7	0	N	7	0	2	D
24	M	34	R	oct	c	LL	110/70	n	n	n	n	n	n	n	n	n	y	n	n	n	7	15	0	N	15	0	4	D
25	M	36	R	oct	u	TR	120/80	y	y	y	y	n	y	n	y	y	n	n	y	y	12	20	3	Y	23	2	12	D
26	F	21	R	oct	v	LL	130/90	n	n	n	n	n	n	n	n	n	n	n	n	y	3	7	0	N	7	0	3	D
27	F	27	U	oct	v	LL	140/90	y	n	n	n	n	n	n	n	n	n	n	n	y	5	8	1	N	9	0	3	D
28	F	35	R	oct	v	LL	130/80	y	y	n	n	n	n	n	n	n	n	n	n	y	3	10	0	N	10	0	3	D
29	M	41	U	oct	u	LL	90/760	n	n	n	n	n	n	n	n	n	n	n	n	y	1	5	0	N	5	0	2	D
30	M	27	R	oct	u	LL	100/70	y	y	n	n	n	n	n	n	n	n	n	n	y	3	8	2	N	10	0	3	D
31	M	55	R	oct	u	LL	120/80	n	n	n	n	n	n	n	n	n	n	n	n	y	4	5	0	N	5	0	2	D
32	M	21	R	oct	u	LL	110/70	y	n	n	y	n	n	n	y	y	n	n	y	y	2	20	0	Y	20	1	5	D
33	M	42	R	oct	v	LL	120/80	y	y	n	y	n	y	n	n	n	n	n	y	y	1	15	0	N	15	0	4	D
34	M	38	U	oct	k	LL	130/80	n	n	n	n	n	n	n	n	n	y	y	n	y	2	20	0	Y	20	0	5	D
35	F	53	R	oct	v	UL	140/90	y	y	y	y	n	n	n	y	n	n	n	y	y	3	25	0	N	25	1	7	D
36	M	30	R	oct	v	UL	140/80	y	n	n	n	n	n	n	n	n	n	n	n	n	4	6	5	N	11	0	2	D
37	M	15	R	oct	v	LL	140/90	y	n	n	n	n	n	n	n	n	n	n	n	y	7	5	0	N	5	0	3	D
38	M	53	R	oct	v	LL	130/70	y	n	n	n	n	n	n	n	n	n	n	n	y	5	6	0	N	6	0	3	D
39	F	31	SU	oct	u	LL	100/70	n	n	n	n	n	n	n	n	n	n	n	n	y	4	7	2	N	8	0	3	D
40	M	29	R	oct	u	LL	130/80	y	y	n	n	n	n	n	n	n	n	n	n	y	1	5	0	N	5	0	3	D
41	M	39	U	oct	u	LL	100/70	y	y	n	y	n	n	n	n	n	n	n	n	y	3	10	0	N	10	0	3	D
42	M	44	R	oct	u	LL	70/50	y	n	n	n	n	n	n	n	n	n	n	n	y	4	10	0	N	10	0	3	D
43	M	16	R	oct	u	LL	160/90	y	n	n	n	n	n	n	n	n	n	n	n	y	3	7	3	N	10	0	4	D
44	M	32	R	oct	v	LL	130/80	y	y	n	n	y	n	n	y	y	n	n	n	y	11	20	3	N	23	2	16	D
45	F	18	SU	oct	v	LL	140/90	n	n	n	n	n	n	n	n	n	n	n	n	y	1	5	0	N	5	0	3	D
46	M	59	R	oct	k	LL	130/80	n	n	n	n	n	n	n	n	n	y	n	n	n	3	15	0	N	15	0	4	D
47	F	21	U	nov	c	UL	110/70	y	n	n	n	n	n	n	n	n	y	y	n	n	11	18	2	N	20	0	6	D
48	F	28	R	nov	v	UL	120/80	y	n	n	y	n	n	n	n	n	n	n	n	y	3	6	0	N	6	0	3	D
49	F	44	SU	nov	v	UL	110/70	y	y	n	y	n	n	n	n	n	n	n	n	y	7	8	5	N	13	0	4	D
50	F	17	R	nov	v	LL	100/70	y	n	n	n	n	n	n	n	n	n	n	n	n	5	5	0	N	5	0	2	D

51	F	34	R	nov	c	UL	110/70	y	n	n	n	n	n	n	n	n	y	n	n	n	7	10	8	N	18	0	4	D
52	F	37	R	nov	c	UL	90/60	y	n	n	n	n	n	n	n	n	y	y	n	n	16	20	10	Y	30	0	5	E
53	M	21	R	nov	c	UL	110/70	y	n	n	n	n	n	n	n	n	y	n	n	n	5	15	0	N	15	0	5	D
54	F	49	R	nov	k	UL	100/70	y	n	n	n	n	n	n	n	n	y	y	n	n	4	18	8	N	26	0	6	D
55	F	19	U	nov	v	UL	130/80	y	n	n	n	n	n	n	n	n	n	n	n	y	6	5	0	N	5	0	3	D
56	F	39	R	nov	u	UL	140/90	y	n	n	n	n	n	n	n	n	n	n	n	y	3	12	0	N	12	0	4	D
57	M	29	R	nov	u	UL	110/70	y	y	y	y	y	y	n	y	n	n	n	n	y	24	25	0	N	25	3	5	E
58	F	43	R	nov	u	LL	160/90	y	n	y	n	n	n	n	n	n	n	n	n	y	5	10	5	N	15	0	4	D
59	M	39	R	nov	u	LL	140/80	y	n	n	n	n	n	n	n	n	n	n	n	y	14	10	6	N	16	0	3	D
60	M	13	U	nov	u	LL	130/80	y	n	n	n	n	n	n	n	n	n	n	n	y	1	10	0	N	10	0	2	D
61	M	30	R	nov	k	LL	120/70	n	n	n	n	n	n	n	n	n	y	n	n	y	4	15	0	N	15	0	4	D
62	M	56	R	nov	c	LL	120/80	y	n	n	n	n	n	n	n	n	y	n	n	n	9	15	7	N	22	0	4	D
63	M	28	R	nov	v	LL	130/70	y	y	y	y	n	n	n	n	n	n	n	n	y	10	15	8	Y	23	0	5	D
64	F	52	R	nov	v	LL	130/80	y	n	n	n	n	n	n	n	n	n	n	n	y	4	12	0	N	12	0	4	D
65	M	29	R	dec	v	UL	130/90	y	y	n	n	n	n	n	n	n	n	n	n	y	3	8	0	N	8	0	3	D
66	M	18	R	dec	c	UL	130/80	n	n	n	n	n	n	n	n	n	y	n	n	n	5	15	0	N	15	0	5	D
67	M	45	R	dec	u	LL	130/70	y	n	n	y	n	n	n	n	n	n	n	n	y	10	10	0	N	10	0	4	D
68	F	27	R	dec	u	UL	130/80	y	n	n	n	n	n	n	n	n	y	y	n	n	16	15	5	N	20	0	6	D
69	M	19	R	dec	v	LL	110/70	y	y	n	y	y	y	n	y	y	n	n	y	y	8	20	4	N	24	3	11	D
70	M	30	R	dec	k	UL	110/70	n	n	n	n	n	n	n	n	n	y	y	n	n	7	18	7	Y	25	0	6	D
71	F	38	R	dec	c	LL	120/80	y	n	n	n	n	n	n	n	n	y	n	n	n	9	10	8	N	18	0	6	D
72	M	27	R	dec	c	LL	120/80	n	n	n	n	n	n	n	n	n	y	n	n	n	6	10	5	N	15	0	5	D
73	M	15	R	dec	v	UL	140/80	y	y	n	y	n	n	n	n	n	n	n	n	n	1	10	0	N	10	0	3	D
74	M	23	R	dec	u	UL	120/70	y	n	n	n	n	n	n	n	n	n	n	n	y	8	9	5	N	14	0	3	D
75	M	21	R	dec	u	LL	120/80	y	n	n	y	n	n	n	n	n	n	n	n	y	7	8	5	N	13	0	4	D
76	M	28	R	dec	u	LL	130/60	n	n	n	n	n	n	n	n	n	n	n	n	y	4	10	0	N	10	0	3	D
77	F	31	R	dec	v	LL	80/60	y	y	y	y	n	y	y	y	y	n	n	y	y	12	25	5	Y	30	2	7	E
78	F	16	R	dec	u	LL	120/80	y	n	n	y	n	n	n	n	n	n	n	n	y	2	10	0	N	10	0	3	D
79	M	42	R	dec	u	UL	150/90	y	n	n	n	n	n	n	n	n	n	n	n	y	5	10	0	N	10	0	6	D
80	M	39	SU	dec	v	UL	130/80	y	n	y	y	y	n	n	y	n	n	n	y	n	12	20	8	N	28	1	8	D
81	M	25	R	dec	k	UL	140/90	y	n	n	n	n	n	n	n	n	y	n	n	n	2	15	0	Y	15	0	5	D
82	M	21	R	dec	u	LL	120/80	n	n	n	n	n	n	n	n	n	n	n	n	y	4	10	0	N	10	0	3	D
83	M	37	R	dec	v	LL	130/80	y	y	n	y	n	n	n	n	n	n	n	n	y	5	18	0	N	18	0	4	D
84	M	16	R	dec	u	LL	140/90	n	n	n	n	n	n	n	n	n	n	n	n	y	1	5	0	N	5	0	3	D
85	M	44	R	dec	v	LL	130/80	n	n	n	n	n	n	n	n	n	n	n	n	y	5	10	0	N	10	0	3	D
86	M	14	SU	dec	u	LL	140/90	y	n	n	n	n	n	n	n	n	y	n	n	n	13	15	10	N	25	0	5	D
87	M	28	R	dec	c	LL	120/80	y	n	n	n	n	n	n	n	n	y	y	n	n	10	20	4	N	24	0	6	D
88	F	21	R	dec	u	LL	120/80	y	n	n	n	n	n	n	n	n	n	n	n	y	2	8	0	N	8	0	3	D
89	F	24	R	jan	v	UL	110/70	y	y	n	y	n	n	n	y	n	n	y	n	y	8	18	5	Y	23	0	7	D
90	M	57	R	jan	v	UL	90/70	y	y	y	y	y	y	n	y	n	n	n	y	y	14	20	3	Y	23	2	9	E
91	F	32	R	jan	v	LL	100/60	y	n	n	n	n	n	n	n	n	n	n	y	y	8	20	0	N	20	0	5	D
92	M	63	R	jan	u	LL	120/80	y	n	n	n	n	n	n	n	n	n	n	n	y	3	10	0	N	10	0	3	D
93	M	19	R	jan	u	UL	120/70	y	y	n	y	n	n	n	n	n	n	n	n	y	8	12	0	N	12	0	4	D
94	M	19	R	jan	u	LL	130/80	y	n	n	n	n	n	n	n	n	n	n	n	y	2	8	0	N	8	0	3	D
95	M	30	SU	jan	u	LL	140/90	y	n	n	n	n	n	n	n	n	n	n	n	y	5	10	0	N	10	0	3	D
96	M	43	R	jan	u	UL	120/80	y	y	n	n	n	n	n	n	n	n	n	n	y	2	8	0	N	8	0	4	D
97	F	29	R	jan	c	LL	110/70	y	n	n	n	n	n	n	n	n	y	n	n	n	5	15	7	N	22	0	5	D
98	F	44	R	jan	v	LL	110/80	n	n	n	n	n	n	n	n	n	n	n	n	y	2	10	0	N	10	0	4	D
99	M	32	R	jan	v	LL	130/70	y	n	n	n	n	n	n	n	n	n	n	n	y	3	8	0	N	8	0	3	D
100	M	26	R	jan	v	UL	140/90	y	y	y	y	n	n	n	y	n	n	n	y	y	9	20	4	N	24	2	8	D

101	M	38	SU	jan	k	LL	120/80	y	n	n	n	n	n	n	n	y	n	n	n	n	2	18	0	N	18	0	4	D
102	M	21	R	jan	u	UL	130/80	n	n	n	n	n	n	n	n	n	n	n	n	y	4	8	0	N	8	0	3	D
103	M	22	R	jan	u	LL	130/70	n	n	n	n	n	n	n	n	n	n	n	n	y	8	10	0	N	10	0	2	D
104	M	34	R	jan	u	LL	120/80	n	n	n	n	n	n	n	n	n	y	n	n	n	2	15	0	N	15	0	4	D
105	M	18	R	jan	v	UL	160/90	y	y	n	y	y	n	n	y	n	n	n	y	y	3	25	0	N	25	1	7	D
106	M	29	R	jan	v	LL	110/70	y	n	n	n	n	y	n	n	n	n	n	n	y	6	10	6	N	16	0	4	D
107	M	19	SU	jan	u	LL	120/80	y	n	n	y	n	n	n	n	n	n	n	n	y	10	8	6	Y	14	0	5	D
108	F	28	R	jan	u	UL	110/70	y	n	n	n	n	n	n	n	n	y	n	n	n	4	16	0	N	16	0	4	D
109	F	27	R	jan	c	LL	110/70	y	n	n	n	n	n	n	n	n	y	y	n	n	9	18	5	N	23	0	8	D
110	F	39	R	jan	u	LL	120/80	y	n	n	y	n	n	n	n	n	n	n	n	y	5	10	0	N	10	0	3	D
111	F	32	R	jan	v	UL	120/70	n	n	n	n	n	n	n	n	n	n	n	n	y	3	12	0	N	12	0	2	D
112	M	25	R	jan	v	UL	130/80	y	y	n	y	n	n	y	n	n	n	n	n	y	7	8	6	N	14	0	3	D
113	M	30	R	jan	u	LL	140/70	n	n	n	y	n	n	n	n	n	n	n	n	y	5	10	0	N	10	0	2	D
114	M	58	SU	feb	v	LL	140/90	y	y	y	y	y	y	n	n	y	n	n	y	y	14	16	8	Y	24	1	6	D
115	F	28	R	feb	k	LL	130/80	y	n	n	n	n	n	n	n	n	y	n	n	y	8	15	5	N	20	0	5	D
116	F	35	R	feb	v	LL	120/60	y	y	n	n	n	n	n	n	n	n	n	n	y	9	12	0	N	12	0	4	D
117	F	17	R	feb	c	UL	110/70	y	n	n	n	n	n	n	n	n	y	n	n	n	7	15	0	N	15	0	5	D
118	M	51	R	feb	u	LL	140/90	y	n	n	y	n	n	n	n	n	n	n	n	y	2	8	0	N	8	0	3	D
119	M	49	R	feb	u	UL	130/90	y	n	n	n	n	n	n	n	n	n	n	n	y	7	12	3	N	15	0	4	D
120	M	55	R	feb	v	LL	140/90	y	y	n	y	n	n	n	y	n	n	n	y	y	9	13	4	N	17	1	5	D
121	M	34	R	feb	v	UL	120/80	y	n	n	y	n	n	n	y	n	n	n	n	y	4	10	0	N	10	0	3	D
122	M	27	R	feb	u	LL	120/80	n	n	n	n	n	n	n	n	n	y	n	n	y	3	15	0	N	15	0	4	D
123	M	16	SU	feb	v	LL	110/70	y	y	y	y	y	n	n	n	n	n	n	y	y	4	12	6	N	18	0	5	D
124	M	28	R	feb	v	UL	130/80	y	n	n	n	n	y	n	y	y	n	n	n	y	3	15	0	N	15	0	4	D
125	M	41	R	feb	u	LL	140/90	n	n	n	n	n	n	n	n	n	n	n	n	y	4	8	0	N	8	0	3	D
126	M	29	R	feb	v	LL	140/90	y	n	n	y	n	n	n	n	n	n	n	n	y	12	8	7	N	15	0	4	D
127	M	18	R	feb	k	LL	130/80	n	n	n	n	n	n	n	n	n	n	n	n	y	6	7	0	N	7	0	2	D
128	M	17	R	feb	c	LL	90/70	y	n	n	n	n	n	n	n	y	y	y	n	n	24	25	6	N	31	0	3	E
129	M	34	R	feb	u	LL	110/70	n	n	n	n	n	n	n	n	n	n	n	n	y	1	8	0	N	8	0	2	D
130	F	24	R	feb	v	UL	120/80	y	y	y	y	n	n	n	y	n	n	n	y	y	8	17	6	Y	23	1	7	D
131	F	13	R	feb	v	LL	140/90	y	y	n	y	n	n	n	y	n	n	n	y	y	16	20	5	Y	25	1	6	D
132	F	46	R	mar	u	UL	140/80	y	y	n	y	n	n	n	n	n	n	n	n	y	5	18	0	N	18	0	4	D
133	M	26	R	mar	v	UL	120/80	y	n	n	n	n	n	n	n	n	n	n	n	y	3	8	0	N	8	0	3	D
134	F	14	R	mar	u	LL	110/70	y	n	n	y	n	n	n	n	n	n	n	n	y	5	12	0	N	12	0	3	D
135	M	28	SU	mar	u	LL	70/50	y	y	y	y	n	y	n	y	n	n	n	y	y	12	22	3	Y	25	3	8	D
136	M	26	R	mar	k	LL	110/70	y	n	n	y	n	n	n	n	n	y	n	n	y	6	20	0	N	20	0	5	D
137	M	23	R	mar	k	LL	120/80	n	n	n	n	n	n	n	n	n	y	n	n	n	1	15	0	N	15	0	4	D
138	M	58	R	mar	v	UL	130/80	n	n	n	n	n	n	n	n	n	n	n	n	y	2	6	0	N	6	0	3	D
139	F	21	R	mar	v	LL	120/80	y	n	y	n	n	n	n	n	n	n	n	n	y	3	10	0	N	0	0	2	D
140	M	19	R	mar	u	F	110/70	y	n	n	y	n	n	n	n	n	n	n	n	y	8	8	5	N	13	0	3	D
141	M	58	R	mar	u	UL	130/80	n	n	n	n	n	n	n	n	n	n	n	n	y	6	6	0	N	6	0	3	D
142	M	21	R	mar	c	UL	110/70	y	n	n	n	n	n	n	n	n	y	n	n	n	4	15	0	N	15	0	4	D
143	M	15	R	mar	u	UL	120/80	y	y	y	y	n	n	y	y	n	n	n	y	y	9	18	4	N	22	1	5	D
144	M	47	R	mar	u	TR	130/80	n	n	n	n	n	n	n	n	n	n	n	n	y	3	8	0	N	8	0	4	D
145	F	34	R	mar	v	UL	110/70	y	n	y	y	n	n	n	n	n	n	n	y	y	24	20	5	N	25	2	6	D
146	F	13	SU	mar	v	UL	120/80	y	y	y	y	n	n	n	n	n	n	n	n	y	3	15	0	N	15	0	4	D
147	F	29	R	mar	k	UL	11O/70	n	n	n	n	n	n	n	n	n	y	n	n	n	5	14	0	N	14	0	5	D
148	M	53	R	mar	u	LL	70/50	y	y	y	y	y	y	n	y	y	n	n	y	y	16	22	5	N	27	2	8	E
149	M	18	R	mar	u	TR	100/70	n	n	n	n	n	n	n	n	n	n	n	n	y	2	8	0	N	8	0	3	D
150	M	23	R	mar	u	UL	110/70	y	n	n	y	n	n	n	n	n	n	n	n	y	5	12	0	N	12	0	3	D
151	M	45	R	mar	v	LL	110/80	y	y	y	y	n	n	n	n	n	n	n	n	y	9	10	7	N	17	0	4	D
152	M	34	SU	mar	c	LL	100/70	n	n	n	y	n	n	n	n	y	n	n	n	n	6	18	0	N	18	0	5	D
153	M	63	R	mar	v	LL	130/80	y	n	n	n	n	n	n	n	n	n	n	n	y	4	7	0	N	7	0	3	D
154	M	25	R	mar	v	LL	120/70	y	y	y	y	n	y	n	n	n	n	n	y	y	2	15	0	N	15	0	4	D
155	M	19	SU	mar	v	LL	110/70	y	y	n	n	n	n	n	n	n	n	n	n	y	3	10	0	N	10	0	3	D
156	M	35	R	mar	v	LL	120/80	y	n	y	y	n	n	n	n	y	n	n	y	y	9	16	7	Y	23	0	5	D
157	F	28	R	mar	u	UL	60/40	y	y	y	y	n	y	y	y	y	n	n	y	y	7	15	6	N	21	1	7	D
158	F	16	SU	mar	u	UL	100/70	n	n	n	n	n	n	n	n	n	n	n	n	y	2	7	0	N	7	0	3	D
159	M	30	R	mar	c	UL	110/70	y	n	n	y	n	n	n	n	n	y	n	n	n	5	16	0	N	16	0	5	D
160	M	23	R	mar	v	UL	100/70	y	y	n	y	n	n	n	n	n	n	n	n	y	8	12	5	N	17	0	4	D
161	M	29	R	mar	v	LL	110/70	y	y	y	y	n	y	n	n	n	n	n	y	n	7	15	0	N	15	0	4	D
162	M	45	SU	mar	u	LL	110/80	n	n	n	n	n	n	n	n	n	n	n	n	y	1	5	0	N	5	0	3	D
163	M	29	R	apr	u	LL	120/80	y	n	n	n	n	n	n	n	n	n	n	n	y	4	8	0	N	8	0	3	D
164	M	65	R	apr	u	LL	160/90	y	y	y	y	n	n	n	n	n	n	n	n	y	9	18	2	N	20	0	5	D
165	M	27	SU	apr	u	LL	110/70	n	n	n	n	n	n	n	n	n	n	n	n	y	5	5	0	N	5	0	5	D
166	F	37	R	apr	u	UL	70/50	y	n	n	n	n	n	n	n	n	y	n	n	y	3	6	0	N	6	0	5	D
167	F	19	R	apr	v	LL	100/70	y	y	y	n	n	n	n	n	n	n	n	n	y	9	12	4	Y	16	0	4	D
168	M	54	SU	apr	v	LL	110/80	y	n	n	y	n	n	n	n	n	n	n	n	y	4	15	0	N	15	0	4	D
169	M	67	R	apr	v	UL	150/90	y	n	n	y	n	n	n	n	n	n	n	n	y	8	10	0	N	10	0	4	D
170	M	19	R	apr	c	UL	110/70	y	n	n	y	n	n	n	n	n	y	y	n	y	12	18	5	Y	23	0	7	D

171	F	39	SU	apr	u	LL	130/80	y	n	y	y	n	n	y	n	n	n	n	n	y	10	15	8	N	23	0	6	D
172	M	23	R	apr	v	LL	140/90	y	y	y	y	n	y	y	y	n	n	n	y	y	10	20	4	N	24	3	9	E
173	M	65	R	apr	c	LL	150/90	n	n	n	n	n	n	n	n	n	y	n	n	n	5	15	0	N	15	0	4	D
174	F	62	SU	apr	u	LL	150/90	y	y	y	y	y	n	y	y	y	n	n	y	y	6	26	0	Y	26	1	8	D
175	M	26	R	apr	v	LL	110/70	y	n	n	n	n	n	n	n	n	n	n	n	y	8	15	0	N	15	0	3	D
176	M	18	R	apr	u	UL	100/70	y	y	n	y	n	n	n	n	n	n	n	n	y	5	12	0	N	12	0	3	D
177	M	21	SU	apr	u	LL	100/60	y	n	n	n	n	n	n	n	n	n	n	n	y	2	8	0	N	8	0	2	D
178	M	25	R	apr	u	LL	120/80	y	n	n	n	n	n	n	n	n	y	n	n	n	6	7	0	N	15	0	2	D
179	M	30	SU	apr	v	UL	60/40	y	y	y	n	n	n	n	n	n	n	n	n	y	8	9	5	N	14	0	5	D
180	M	17	R	apr	k	LL	110/90	y	n	n	n	n	n	n	n	n	y	n	n	y	3	15	0	N	15	0	6	D
181	M	26	R	apr	u	LL	120/80	y	y	n	y	n	n	n	n	y	n	n	n	y	9	15	4	N	19	0	4	D
182	F	21	R	apr	v	UL	110/70	y	n	n	n	n	n	n	n	n	n	n	n	y	3	7	0	N	7	0	3	D
183	M	42	R	apr	u	LL	130/80	n	n	n	n	n	n	n	n	n	n	n	n	Y	4	5	0	N	5	0	3	D
184	F	25	R	apr	v	LL	140/90	y	y	n	y	n	n	n	n	n	n	n	n	y	12	12	5	N	17	0	6	D
185	M	63	R	apr	c	UL	110/70	y	n	n	n	n	n	n	n	n	y	n	n	Y	6	15	0	N	15	0	4	D
186	M	29	R	apr	u	LL	120/80	y	y	n	y	n	n	n	n	n	n	n	y	y	5	18	0	N	18	0	4	D
187	M	47	R	apr	u	LL	90/60	y	y	y	y	y	y	y	y	n	n	n	y	y	20	26	10	N	36	3	6	E
188	M	24	R	apr	v	UL	100/60	y	n	n	y	n	n	n	n	n	n	n	n	y	5	10	0	N	10	0	3	D
189	F	39	R	apr	u	LL	90/60	y	y	y	y	n	y	n	y	n	n	n	y	y	8	25	0	N	25	1	7	D
190	M	16	R	apr	u	UL	110/70	y	n	n	n	n	n	n	n	n	n	n	n	y	4	15	0	N	15	0	5	D
191	M	29	R	apr	v	LL	120/80	y	y	n	y	n	n	n	n	n	n	n	n	y	8	16	5	N	21	0	4	D
192	M	28	R	apr	v	LL	130/80	y	n	n	y	n	n	n	n	n	n	n	n	y	3	10	0	N	10	0	5	D
193	F	43	R	apr	u	UL	140/90	y	n	n	n	n	n	n	n	n	n	n	n	y	5	12	0	N	12	0	3	D
194	M	31	R	apr	u	UL	90/60	y	y	y	n	n	y	y	y	n	n	n	y	y	14	20	10	Y	30	1	8	D
195	M	26	R	apr	u	UL	100/70	n	n	n	n	n	n	n	n	n	n	n	n	y	3	10	0	N	10	0	3	D
196	M	21	R	apr	u	UL	110/70	y	n	n	n	n	n	n	n	n	n	n	n	y	4	15	0	N	15	0	4	D
197	M	13	R	apr	c	LL	110/70	y	n	n	n	n	n	n	n	n	y	n	n	y	9	18	7	N	25	0	6	D
198	M	19	R	apr	u	TR	120/80	y	y	n	y	n	n	n	n	n	y	n	n	y	3	10	0	N	10	0	10	D
199	M	38	R	apr	u	LL	110/70	n	n	n	n	n	n	n	n	n	n	n	n	y	4	8	0	N	8	0	3	D
200	F	37	R	apr	u	LL	110/70	n	n	n	n	n	n	n	n	n	n	n	n	Y	3	7	0	N	7	0	3	D