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RESEARCH ARTICLE

CLINICAL PROFILE OF PATIENTS OF SNAKE VENOM OPHTHALMIA PRESENTING TO THE TERTIARY HEALTH CARE CENTRE

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Diminution of Vision, Photophobia, Conjunctival Congestion, Chemosis, Corneal Edema, Corneal Erosions And Anterior Chamber Reaction

Abstract

Purpose: To study the clinical profile of patients of snake venom ophthalmia presenting to the tertiary health care centre.

Methods: This was a prospective observational study that involved25 patients with snake venom ophthalmia complaining of pain, diminution of vision, photophobia, conjunctival congestion , chemosis, corneal edema, corneal erosions and anterior chamber reaction.

Results: There were 18 males and 7 females and the age group taken was 30 to 75 years. Most common presentation in snake venom ophthalmia patients is pain in 92% patients followed bydiminution of vision in 90% patients,conjunctival congestion in 88% patients, photophobia in 84% patients, chemosis in 80% patients, corneal edema in 65% patients, corneal erosions in 55% patients and anterior chamber reaction in 35% patients.

Conclusion: Snake venom ophthalmia due to venom spitting is a reflex mechanism aimed at ejecting venom forcefully into the eyes of the victims. Snake venom may contain a mixture of neurotoxins, cytotoxins, phospholipases and cardiotoxins. The ocular effects of the venom depend on duration of contact of ocular surface with venom. Snake venom ophthalmia is rare form of envenoming which presents as intensely painful blurred vision associated with photophobia, conjunctival congestion, chemosis, corneal epithelial defects and anterior chamber reaction.

Introduction:-

Snakes are carnivorous reptiles, which are cold-blooded animals. They inhabit every continent and ocean (sea snake) [1] except Antarctica. Some snakes are venomous while some are not. Venomous snakes comprise four families, including Colubridae, Elapidae, Viperidae, and Atractaspididae [2]. Among snake species, spitting cobras, a member of the Elapidae family snakes, can spit venom from Duvernoy's gland while irritated or threatened. The tiger keelback, a member of the Colubridae family snakes often found in East Asia, conducts a toxin spray from its nuchal gland. After a toxin spray attack, the eyes are most often affected, causing inflammatory responses in the anterior segment of the eye. In venom spray ophthalmia, many symptoms such as hyperemia, uveitis, and corneal erosions are common complications after venom spray [3].

Ocular complications in the posterior segment are often observed after snakebite. An epidemiological study of 180 snakebite patients in India reported that 69% of victims present with ocular neuroparalytic manifestations [4]. Most

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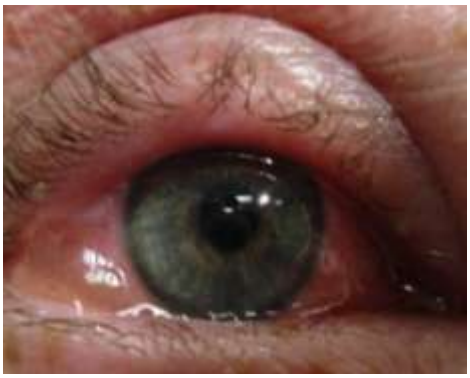
viperidae snakes discharge venom as the fangs hook into the victim, and then immediately release the bite. However, some species (e.g., Lachesis) may hold the bite, discharging a larger amount of venom to kill the victim, especially in times of starvation. So far, about 59 protein families have been identified in venoms, which are capable of inflicting neurotoxicity, cytotoxicity, hematotoxicity, and myotoxicity, [5] and most snake venoms have mixed effects. Hemotoxins in snake venom cause hemolysis, destruction of erythrocytes, and blood clotting. Since hemotoxins are abundant in viperidae, ocular hemorrhage and secondary inflammatory responses are the most common ocular complications by viper snake envenoming. Neurotoxins in snake venom cause neurological disorders in the eye, such as ocular muscle paralysis, ptosis, and diplopia. Without immediate treatment, patients can be left with permanent tissue damage, blindness, or even death from respiratory muscle paralysis.

Method and Material:-

This was a prospective observational study that involve 25 patients with snake venom ophthalmia complaining of pain, diminution of vision, photophobia, conjunctival congestion , chemosis, corneal edema, corneal erosions and anterior chamber reaction. Patients were recruited from the OPD of MLB MEDICAL college, Jhansi , Uttar Pradesh and were followed from 20th August 2022-20th February 2023 . It was performed under the Helsinki Declaration of 1975, as revised in 2000. The necessary permission from the Ethical and Research Committee was obtained for the study.

Conjunctival Congestion



Conjunctival Congestion With Chemosis

Corneal Edema With Corneal Erosion

Corneal Edema With Anterior Chamber Flare

Inclusion criteria

All patients between the age group 30 to 75 years who presented to the OPD of MLB medical College Jhansi with the complaint of pain, diminution of vision, photophobia, conjunctival congestion , chemosis, corneal edema, corneal erosions and anterior chamber reaction following exposure of eyes to spitting of snake venom.

All patients were subjected to a detailed history taking, complete ophthalmic examination in diffuse and focal light followed by slit lamp examination.

Exclusion criteria

1.Patients outside the age group of 30 to 75 years
2.Patients with any other corneal pathology.
3.Patients with other conjunctival diseases.
4.Patients with any other ocular pathology.
5.Mentally or physically unfit patients.

Results:-

A total of 25 patients were studied, out of which 18 are males and 7 are females. We included patients with the complaint of pain, diminution of vision, photophobia, conjunctival congestion , chemosis, corneal edema, corneal erosions and anterior chamber reaction.

Table 1:- Age distribution.

	Age group	no. of patients
1	30 to 45 years	14
2	46 to 60 years	07
3	61 to 75 years	04

Table 2:- Gender distribution.

	Gender	no. of patients
1	Male	18
2	Female	07

Table 3:- Clinical profile of patients having exposure to snake venom.

	Symptoms	% of patients
1	Pain	92%
2	Diminution of vision	90%
3	Conjunctival congestion	88%

4	Photophobia	84%
5	Chemosis	80%
6	Corneal edema	65%
7	Corneal erosions	55%
8	Anterior chamber reaction	35%

Discussion:-

Naja is a genus of venomous elapidae, also known as cobras. Several species of Naja cobras can spit their venom from Duvernoy'sgland , where venom is generated and stored, through fangs onto victims.

In Asia , N. atra, also called the Chinese cobra, is found most in Taiwan and China. An epidemiological survey of venom-spit ophthalmia from 1990 to 2016 in Taiwan studied a total of 39 cases suffering from N. atra [6]. Data showed that most cases involved a single eye (82%) to male (95%) adults between 18 to 59 years old (90%). About half of the cases occur during catching (51%), while most occurred in hot seasons (spring and summer, 92%). About nine in ten have ocular symptoms including ocular pain (90%) and redness (85%), conjunctivitis (67%), and corneal injury (59%). After immediate water irrigations, most cases (77%) were symptom free after the acute stage. Although no children were reported in Taiwan, snake venom spitting was also considered one of the causes of eye burn in children in other courtiers [7]. Another venom-spit ophthalmia by N. atra was reported from an 83-year-old woman in Hong Kong while she was trying to kill the cobra [8]. After being treated with 0.5% chloramphenicol and 0.12% prednisolone eye drops, she went home without severe symptoms. N. siamensis, also called the Indochinese spitting cobra, is a species most found in Southeast Asia. A 45-year-old man in Laos was spat on by N. siamensis on both eyes, about 2 m away from the cobra [3]. Luckily, he presented without evidence of corneal injury. He received topical epinephrine drops 1:10,000 and recovered completely in 24 h. N. naja, also called the Indian cobra, is a species found in India and neighbouring countries. A male cobra player was spat on by N. naja on his left eye [3]. Since he was sprayed at from a short distance (20 cm), he experienced eye pain, conjunctival inflammation, and swelling of the eyelids, despite an immediate tap water wash. After treatment, his symptom was alleviated.

The nuchal gland, also named nucho-dorsal gland or cervical gland, is a special defensive system in some species of snakes such as the Rhabdophis genus [9,10]. These snakes consume a poisonous prey and conserve the poison in their nuchal glands to spray the stored poison for defense. A first observation of snakes with nuchal glands was reported in 1935 by Nakamura [11] and nine more species were reported by Smith three years later [12]. Although most nuchal glands were found at the back of the neck, some nuchal glands were observed across the whole body on some snakes [13]. To date, there are 13 species of snakes found in three genera (Rhabdophis, Macropisthodon, and Balanophis) that have nuchal glands [9]. They consume toads (Bufonidae) and store the toad's poison in their nuchal glands [13]

Most snakebites occur on limbs and venomous toxins circulate in the host body, reaching the eye and leading to ocular complications. Since retina and choroid are rich in vessels [14], posterior segment complications are often observed in snakebite victims. Common symptoms are central retinal artery occlusion (CRAO) [15–18], retinal or vitreous hemorrhage [19], and macular infarction [19]. A rare case even reported that a 13-year-old boy was diagnosed with retinal detachment after snakebite [20]. Even after receiving immediate treatment for posterior complications, most patients claim their vision is not the same as it was. Since the cornea and lens are avascular tissues, snake venoms do not directly injure these tissues. However, some anterior segment complications such as corneal striae, cataract, anterior pseudohypopyon, anterior ischemia, and iris atrophy were also observed in the eye of snakebite victims [21,22].

Snake venom injection may cause a lifelong ocular morbidity. A case in Nigeria showed a 10-year-old boy bitten by a brownish snake (presumably carpet viper). He was brought to the Emergency Pediatric two weeks after snakebite with local swelling, epistaxis, bilateral proptosis, and exposure keratopathy. Although the antivenom was administered to save his life, he left the hospital with bilateral blindness [23]. Another case reported a 14-year-old Indian boy who was given IV injection of methylpredinisolone in the hospital after snakebite [24]. He was diagnosed with vitreous hemorrhage in his right eye. At follow-up after one month, he still had no perception of light in his right eye due to no improvement in the vitreous hemorrhage. Therefore, he lost vision in one eye. Apart from bites to the limbs, only a few cases have been reported in which the eye was bitten directly. A 34-year-old man who suffered an ocular bite by a venomous snake, Agkistrodon acutus (hundred-pace snake, one of the most toxic snakes in the world) to his right eye causing subconjunctival hemorrhage, sever necrosis of the corneal endothelium,

and exophthalmos. Although he received immediate ocular surgery, maintaining his vision and preventing infection was a challenge for him. Another 5-year-old female patient suffered from snake venom injection directly to her eye, leading to eye enucleation due to sever ocular necrosis.[25]

Venom Exposure by Accidental Touch

Notechisscutatus, also called the tiger snake, is found in south Australia. Tiger snakes do not spit venom onto their victims. However, there is a case of venom-exposed ophthalmia due to carelessly touching one's eye while handling the tiger snake's venom sample [3]. This is a rare case of venom-induced ophthalmia from a non-spitting snake.

Conclusion:-

Among the land snakes worldwide, spitting cobras (Naja) are the most common species to contribute to venom ophthalmia. They can spit as far as 2 m, which indicate a dangerous zone in a circle of 2-m diameter around the spitting cobra. Immediate eye irrigation is always the first procedure to remove venom from the eye, followed by topical antibiotics, corticosteroids, and analgesics. Anterior segment complications such as corneal injury, conjunctivitis, Keratitis, and anterior chamber reaction are usually diagnosed following venom ophthalmia, and most patients recovered without sequelae within 1–2 weeks. Overall, immediate ocular irrigation with generous volumes of tap water or saline is recommended for venom ophthalmia. Topical use with local anesthetic drops and use of vasoconstrictors such as epinephrine is advisable .The hemotoxin of vipers may cause severe posterior segment complications, secondary to anterior segment complications, despite administration of ample antivenom. Impoverished regions lacking health resources may experience delay in administering antivenom or insufficient supportive treatment, which partly contribute to the increased prevalence of ocular injury and permanent blindness. Currently, administration of intravenous antivenom, as soon as possible, is likely to be the most effective treatment though further novel therapeutic development strategies are still in process for neutralizing toxins of snake venom.

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