Study the Effect of Many Medications in Ophthalmomyiasis Treatment and the Possibility of Using these Medications Instead of Mechanical Removal

Dhuha Mahdi Jabir[1], Ghada Basil Ali Alomashi[2]

[1]Scholar Researcher, College of Sciences, [2]Scholar Researcher, Deportment of Medical Microbiology, College of Medicine, University of AL- Qadisiyah, Iraq

Abstract

This study was aimed to find the most suitable method to treat ophthalmomyiasis cases in Iraq, especially in diwanyia city. So that the study was conducted on 30 cases, where the drug xylocaine was dropped to the eye eight of them, and turpentine oil was dropped to eight others, while both anesthetics were applied to four of the patients, Then wait for 20 minutes and remove the larvae using forceps and by a specialist ophthalmologist .ten of patients were given ivermectin orally without any ivermectin to gather can immobilize the larvae thus facilitate their removal, it also found that using ivermectin is very effective in the treatment and can be used for clearing eye from larvae even after mechanical removal without any danger from side effect.

Keywords*: ophthalmomyiasis, ocular myiasis, xylocaine, lidocaine, turpentine oil**,** ivermectin, immobilization of larvae*

Introduction

Myiasis is the invasion by fly larvae of living or dead human (or animal) tissue. Ophthalmomyiasis contributes to the eye's larval infestation. Ophthalmomyiasis externa refers to infestation, including conjunctiva and cornea, of the external ocular structures, whereas ophthalmomyiasis interna refers to intraocular larval penetration [1]. It usually occurs in shepherds and farmers in rural areas, but it has been documented in urban areas as well as in patients without close contact with animals. Other risk factors that have been identified include eye infections, eye wounds, advanced age, weakening, lack of diet and treatment, and poor hygiene. Cases of ophthalmomyiasis have been recorded in many nations around the world[2]. The causative agent might be the sheep botfly or *Oestrus ovis*, which is the most common cause of human ophthalmomyiasis, besides many other species have also been described, such as the human bot fly (*Dermatobia hominis*) latrine fly (Fannia), house fly (*Musca domestica*), and old screw worm *chryosoma bezzina*.[3,4], in addition to many other species that cause the infection accidentally when infecting the skin, the clinical feature of the infection varies from severe foreign body sensation and redness, rhinorrhea, chemises, and swelling. Conjunctivitis may be imitated by these initial signs and symptoms of external ophthalmomyiasis. Symptoms have been reported in patients with internal ophthalmomyiasis, including photopsies, floaters, vision lines, and eye pain [5]. Management of infection with ophthalmomyiasis externa can be mainly accomplished by the mechanical removal of larvae from the eye at first and then the patient

Corresponding author:
Dhuha Mahdi Jabir
Email: dhuha.mahdijabir@qu.edu.iq

must be given topical analgesics and antibiotics, larvae attachment to eye tissue by their hooks make the removal difficult because the larvae escape from the edge of the eye to inside when direct slit lamp [6], using of antihelminthic are less common, in addition to only one case has treated with ivermectin successfully is recorded which" has shown benefit as a therapy and a prophylactic treatment for bot fly infestation of livestock"[2]. Some studies have mentioned the possibility of using many medications or ophthalmic anesthetics that can either paralyze larvae inside the eye or stop the motility of it. Among these compounds liquid paraffin, beeswax, heavy oil, or nail polish, it seems to be situated above the central field, Performance. The aerobic larvae are forced by such blockage air to the floor, at which point they can be caught by forceps in addition to lidocaine which can be injected into the cavity base is inhabited by the larvae, pushing the larva towards the surface. Instead, ethyl chloride they have sprays, liquid nitrogen, and insecticides. Used in conjunction or alone [7]. the topical 4% xylocaine and turpentine oil packing were used to immobilize the larvae in many orbital myiasis cases management [8]. It is worth noting that none of these compounds is used in Iraqi hospitals, despite the spread of severe cases during the spring, summer, and autumn period .in fact the epidemiological data refers to recording about 85 cases of ocular myiasis only in diwanyia city (south of Iraq) at 2020[9]. if we consider this ratio is affected by closing that occurs due to pandemic coronavirus disease, the number of cases may be more than what recorded The aim of the present study was try to find suitable and safe artificial or natural substance can be helpful with removal of larvae that cause opththalmomyiasis.

Materials and Methods

1- Diagnosis

According to the symptoms which include itching, burning, lacrimation, rhinorrhea, foreign body sensation, and swelling, the history of the patient is very beneficial in diagnosis as the patient might recently be in close contact with an animal or not.

2- Larvae treatment

30 clinical cases were approved for the study. As the patients were divided into three groups, as follows

The first group included 8 casualties who were given 4% xylocaine and then removed the larvae using forceps, the second group includes 8 patients who were given packed turpentine oil and then removed the larvae by the same method, while 4 of the patient were given both turpentine oil and xylocaine to gather, all those 20 patients were given time about 15-20 minutes before mechanical removal process, the third group was given ivermectin orally without any surgical intervention. With it is worth noting that the patients in the third group were all residents of the village to ensure that their recovery was followed up by the village doctor and the results were recorded as for the first and second groups, they were randomly assigned. Taking into account giving the patient some antibiotics such as metronidazole, cefazolin, and amoxicillin with clavulanic acid to avoid secondary bacterial infection.

3. Statistical Study

Response surface methodology has been used as a statistical method depending on design expert V12 software. (A statistical method explains the relationship among several variables)[10], so in this study lidocaine and turpentine oil were the variables and their amounts and duration of administration are shown in table 1 below as suggested by the application.

Table 1 the design actual of medication using

Std	Run	Factor1 xylocain ml	Factor2 Turpentine oil ml
1	1	0	0
8	2	0.5	1
9	3	0.5	0.5
3	4	0	1
5	5	0	0.5
11	6	0.5	0.5
2	7	1	0
4	8	1	1
7	9	0.5	0
6	10	1	0.5
13	11	0.5	0.5
10	12	0.5	0.5
12	13	0.5	0.5

Results and Discussion

This study was aimed to find an easy, suitable, and fast means to treat ocular myiasis cases. So that many topical ophthalmic anesthetic and anti-parasitic drugs have been used separately, it's important to know that these medications are common in most countries but it rarely used in Iraq.

Two anesthetic drops have applied on 24 patients with ocular myiasis. these anesthetics were turpentine oil, 4% xylocaine which was added to the infected eye each one separately and recorded the results after 15-20 minutes. The results are explained in table 2 below showed positive results only when used to gather.

Table 2

Std	Run	Factor1 xylocain ml	Factor2 Turpentine oil ml	Response1 Motility
1	1	0	0	1
8	2	0.5	1	0
9	3	0.5	0.5	0
3	4	0	1	1
5	5	0	0.5	1
11	6	0.5	0.5	0
2	7	1	0	1
4	8	1	1	0
7	9	0.5	0	1
6	10	1	0.5	0
13	11	0.5	0.5	0
10	12	0.5	0.5	0
12	13	0.5	0.5	0
Maximum Variance Mean 0.7902		Average Variance Mean=0.28		Minimum Variance Mean=0.1701

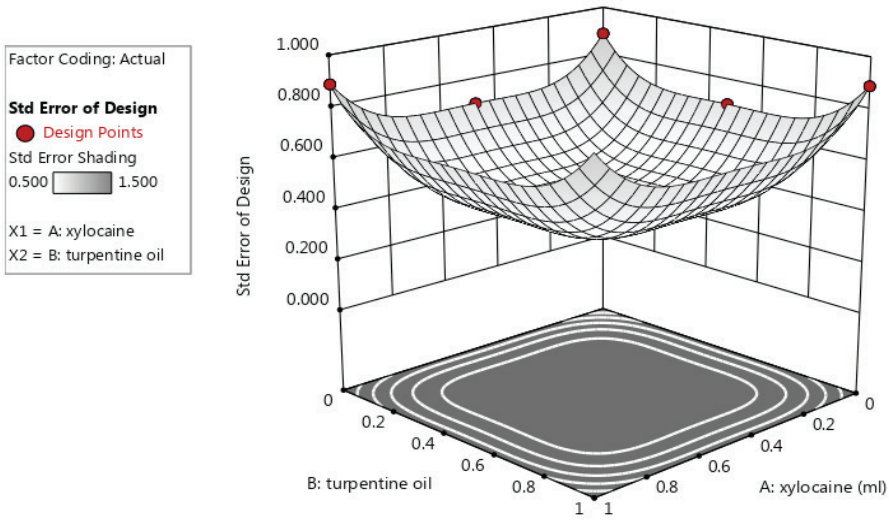

Figure 1: 3Dexplain graph explains the activity of larvae immobilization

Xylocaine is the brand name of lidocaine is a local anesthetic of the amino amide type, it is an activity that begins within several minutes to about half an hour [12].

Its properties are represented in table 3 below

Table 3 lidocaine properties [13]

Clinical name	Lidocaine
Trade name	xylocaine
Chemical formula	$C_{14}H_{22}N_2O$
Molar mass	234.343gmol-1
Melting point	68 (154C) °F
Metabolism	Liver,[3] 90% CYP3A4-mediated
Duration of action	min to 20 min(IV), 0.5 h to 3 h (local)
Bioavailability	35% (by mouth) 3% (topical)
Elimination half-life	1.5 to 2 h
Extraction	kidney

Since it belongs to the family of medicines called local anesthetics, its mechanism of action is represented by blocking the signal of nerve in the eyes, and thus it applied successfully to cause loss of feeling before certain procedures.it also might cause loss of feeling to larvae responsible for ocular myiasis defect by the same action. In the present study, the results of using lidocaine alone were not very effective in larvae immobilization and no paralyzing was examined also. Contrary to what was mentioned in some papers. "Agents used for paralyzing the larvae: Chloroform, Ether Lidocaine 1% and Pilocarpine [4]. But we can say using lidocaine as an eye drop in ocular myiasis cases is effective in pain relief with no side effects and helps the ophthalmologist to remove the larvae safely.

The turpentine oil is Turpentine (also known as turpentine spirit, turpentine oil, serpentine wood, terebinthine, terebinthine, and (colloquially) turpentine) is a liquid extracted from the distillation of resin obtained from living trees, predominantly pines. It is also a source of material for organic synthesis, mainly used as a specialized solvent [14]. Its properties are explained in t below able below

Table 4 turpentine oil charecterstics[15]

Chemical formula	C10H16
Molar mass	163.238g mol-1
Appearance	liquid with a high viscosity
Oder	Resinous
Melting point	-55 C(-67F:218K)
Solubility in water	20mg/L(1)
Boiling point	154C

It has a variety of medical uses such as muscle, joint pain, and tooth's each, to minimize chest congestion that goes along with certain lung diseases; people often breathe in (inhale) the vapors of turpentine oil. Distilled turpentine oil is used as a flavoring in foods and beverages. It is also used for immobilizing maggots in ocular myiasis cases because it can suffocate them thus facilitate the mechanical removal process [16]. Despite the medical importance of turpentine oil, many research warnings use it due to its toxicity and irritant properties [17]. However, it can be replaced by another safe ointment that can act the same as turpentine oil.

Ivermectin is one of the important antiparasitic drugs approved by FDA that are used in many parasitic infections treatments such as filariasis, bancroftian, onchocerciasis, strongyloidiasis, and scabies. It was also used successfully for opthalmomyiasis inetrna posterior (OIP) treatment [18] the results of the present study showed that all 10 patients received a single oral dose of 10 mg (200µg\kg) of ivermectin were healed within two days.

The mechanism of action of this medication is characterized by interfering with helminths muscle and nerve functions, "it's bound to glutamate-gated chloride channels that are common to invertebrate nerve and muscle cells, Ivermectin binding pushes these channels open, increasing the flow of chloride ions and hyper-polarizing the cell membranes.[19,20]. The affected tissue is paralyzed, and the invertebrate dies as a result of hyperpolarization. Glutamate-gated chloride channels are limited to the brain and spinal cord in mammals (including humans); ivermectin cannot cross the blood-brain barrier and therefore does not reach the brain to impact mammalian channels [16]. Many recent studies have recommended using ivermectin to treat severe acute respiratory syndrome coronavirus [21]. The scientific base depends on many reports from in vitro studies indicate that ivermectin works by inhibiting alpha/beta-1 nuclear transport proteins from the host import, which are part of a main intracellular transport mechanism that hijacks viruses by suppressing the antiviral response of the host to improve infection [22]. Furthermore, docking with ivermectin can interfere with the attachment of the virus spikes to the human cell [23]. It is thought to be a host-directed agent that may be the basis for its in vitro broad-spectrum activity against yellow, HIV, Zika, and dengue fever viruses[24]. Despite this activity of ivermectin, there are no clinical trials that have reported a clinical advantage of ivermectin in patients with these viruses, despite this in vitro activity. Potential anti-inflammatory effects, which were postulated to be beneficial in people with COVID-19, were also recorded in some studies of ivermectin[25].

Conclusion

At last, ivermectin can be safely recommended for ocular myiasis treatment either interna or external, and even when the mechanical removal is done successfully because of its important role in clearing the eye from residual larvae.

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