



ICH AND WHITE EYE DISEASE MANAGEMENT IN FISHES USING NOVEL COMPONENTS

G. V. Ade¹ and P. M. Makode²

1. Department of Zoology, Shankarlal Agrawal Science College Salekasa, Dist-Gondia, Maharashtra.
2. Shri. Dr. R.G. Rathod Arts & Science College Murtizapur. Dist. Akola, Maharashtra

ABSTRACT:

Ich is a disease caused by a protozoan *Ichthyophthirius multifiliis* responsible for high mortality among fishes. *Aeromonas liquefaciens* bacterium causes white eye disease in fishes. In the present study effects of potash alum and cow urine were analyzed for treating Ich and white eye disease in wild guppy fishes and goldfishes. 0.5g potash alum/ liter of water showed prominent activity for white eye. Cow urine distillate of concentration 1.5 ml in 1 liter of water, in prolonged bath treatment, gave satisfactory disappearance of ich in 48 hours with the disappearance of white spot on fishes. Instead of using harmful costly chemicals and antibiotics for treating mentioned fish diseases, potash alum and cow urine proved non-toxic, easily available and cost-effective alternatives. As potash alum and cow urine have no toxic effects on humans handling them and on flora and fauna of ponds can be used as a cheap and eco-friendly treatment for fishes.

Keywords: *Ichthyophthirius multifiliis*, *Aeromonas liquefaciens*, Cow urine distillate, Potash alum,

INTRODUCTION:

Fishes, like all the other organisms, are prone to several diseases. It is therefore important to keep them in healthy condition, by keeping them in healthy water and by detecting and curing the disease if any, at an early stage. Diseases in fishes are caused by mainly bacterial and fungal infections. Worms, copepods, and various other parasites also infect various fish species. White-eye and Ich are among the most common diseases in fishes.

• Ich Disease:

It is one of the most common and persistent diseases in fish. It appears on the body, fins, and gills of fish as white nodules of up to 1mm, that look like white grains of salts. Ich, also known as white spot disease. The causative agent of disease ich is *Ichthyophthirius multifiliis*. It is a ciliated protozoan and an ectoparasite of freshwater.

The young parasite moving in the water gets attach to the skin of the fish. They grow between the epidermis and dermis and after becoming large in size, (about 1mm) fall to the bottom of the pond. Here they encyst and then multiply rapidly to produce a large number of offspring, ready to search for a new host. Affected fishes developed white spots on the skin and the fins. Problems faced by the fish due to disease white spot or ich is, they swim to the surface more often due to difficulty breathing, hence respiration gets affected, and a severe attack may result into the loss of fishes. Mobility problems also occur and due to this, even death. Symptoms of this disease are; scratching against stones and decorative objects. Fins get folded against the body, white spots on the body and fins, white spots may join together to form a white patch and loss of appetite. An outbreak of "Ich" is an emergency situation that requires immediate treatment: if

left untreated, this disease may result in 100% mortality. [5, 7]

• **White eye disease :**

White eye disease, it is mostly found on goldfish that have protruding eyes. This is because they are more prone to injury and then infection by sneaky bacteria. The causative agent of disease white eye in fishes is *Aeromonas liquefaciens*. It is a rod-shaped gram-negative bacterium found in fresh water and salt water. Both infected sites are eyes optic nerves and brain of the fish. The problem face by the fish is eye become cloudy almost to the point of whiteness and fish loses vision. Symptoms of the disease are cloudy white or gray haze over the eye, loss of vision, and may show signs of distress. [7]

Various treatments are given for treating Ich in fishes. These includes formalin, potassium permanganate, sodium chloride, copper sulphate. White eye disease is treated by using various kinds of antibiotics. Present study is focused on the use of easily available, cheap and nontoxic substitutes for Ich and white eye disease in fishes.

The substitutes used here are:

i. Cow urine -

Cow urine is also known as Gomutra. It is not a toxic waste material. 95% of it is water, 2.5% consist of urea and remaining 2.5% is a mixture of minerals, salts, hormones, and enzymes. Antimicrobial and germicidal property of cow urine are due to presence of urea, creatinine, aurum hydroxide, carbolic acid, other phenols, calcium and manganese.[9]

Cow Urine Distillate:

Distillation is the process of separating the components or substances from a liquid mixture by using selective boiling and condensation. Distillation results in essentially complete separation, nearly pure components that increases the concentration of selected components in the mixture.

Process of Distillation:

The distillation apparatus is a vessel with tight lid and a tube for vapour outlet. This vessel is filled with cow urine and put on fire for heating. The vapours from the vessel are collected in a receiver. This receiving vessel is put in cold water, to condense the vapour. The condensed liquid is Ark or distillate.

Cow urine has wide range of uses such as it used as disinfectant and for purification, it also being used as an effective antiseptic for wounds, and skin diseases. It acts as an excellent germicide and a potent antibiotic and therefore, cow urine therapy destroys all the pathogenic organisms.

ii. Alum

Chemical Nature: An alum is a type of chemical compound, usually a hydrated double sulfate salt of aluminum with the general formula $XAl(SO_4)_2 \cdot 12H_2O$ where X is a monovalent cation such as potassium or ammonia. By itself, alum often refers to potassium alum, with the formula $KAl(SO_4)_2 \cdot 12H_2O$. other alums are named after the monovalent ion, such as sodium alum and ammonium alum. The most widely used alum is potash alum in treatment of water, in medicine, for cosmetics and also in food preparation that is pickling.

Properties of alum:

- Alum powder readily dissolve in water and the solution thus obtain is slightly sweetish in taste.
- It is acidic in nature and turns of litmus paper red.
- It possesses amazing antiseptic quality which helps to destroy germs and prevent their growth on the body tissue.
- It act as an excellent astringent that enables the skin tissue to shrink and thus do not let the germs get into skin pores.

REVIEW OF LITERATURE:

- Dutta S et.al., (1996) performed antimicrobial activity profile of potash alum in vitro against number of bacteria. They observed profound effect of potash alum on *Vibrio cholerae*. In their studied they reported the bactericidal activity of potash alum when added to water against various endemic causing enteric pathogen like *Vibrio cholera* and *Shigella dysenteriae*.
- Darlene M et al., (2001) studied the effect of various chemicals were against *Ichthyophthirius multifiliis* (ich) infestations of channel catfish *Ictalurus punctatus*. Sodium chloride hydrogen peroxide, potassium permanganate, elevated temperatures, chloramine-T, povidone iodine, and high flow rates were found ineffective under all conditions and concentrations tested. They investigated that copper sulfate effective in blocking the infestation of healthy fish, but it did not eliminate established infestations on channel catfish and Malachite green and methylene blue eliminated established infestations on fish.
- S.A Mandavgane et.al., (2005) prepared cow urine based disinfectant due to antimicrobial activity of carbolic acid in cow urine which is a mixture of phenol and trisol.
- Singh 2005 found out the anti-leshmanial effect of cow urine while searching for an alternative to fetal calf serum (FCS) which is used as growth supplement in the media for *Leishmania donovani*, an intracellular protozoan parasite causing leshmaniasis , kala azar ,a disease which is highly endemic in the Indian subcontinent .
- Edwin Jarald et.al (2008) studied antioxidant and antimicrobial activities of cow urine. They have studied antimicrobial activity against *Escherichia coli*, *Staphylococcus aureus*, *Staphelococcus epidermis*, *Bacillus subtilis*, and *Klebsella pneumonia* and *Proteus vulgaris*.
- Ihman Abass et al., 2014 tested the effects of aqueous solution of alum against *S. aurius*, *S. epidermis*, *E. coli* and *Clebsella pneumoniae* with positive results.
- Ipsita Mohanty et al., 2014 studied diversified uses of cow urine including antimicrobial activity. According to their research the components present in solvent extraction enhance the phagocytic activity of macrophages and thus helpful against bacterial infection.
- Lawrence O Amadi et.al., (2017) published susceptibility profiles of alum on bacteria isolated from shellfish bivalve oyster. From their study they concluded that potash alum exhibited broad spectrum antibacterial potency against bacteria

such as *Proteus* sp. *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella* species, *Pseudomonas aeruginosa* and *Vibrio* species. Their study demonstrated that, alum can be used as antimicrobial agent in food system to combat some spoilage bacteria and food borne pathogen.

- Sridhar K et al (2018) fed Catla fishes with herbs *Aegle marmelos* and *Spinacia oleracea*. Then they analyzed muscle tissue extract of fishes fed with above mentioned herbs for the presence of bioactive compounds of that herbs. They used this muscle extract to study bactericidal activity against *Aeromonas hydrophila* and *Aeromonas liquefaciens* with high level of inhibition against these bacteria.
- Effect of calcium oxide and sodium chloride for treatment of Ich disease on goldfish was studied by Rahanandeh M. et al (2020). They found inhibitory effect of Calcium oxide at 15 mg/lit concentration and sodium chloride at 2500 mg/lit concentration for controlling of Ich in gill area
- K. Puk et al (2021) evaluated *Tanacetum vulgare* for antiprotozoal activity against *Ichthyophthirius multifiliis*. They found that water extract of *T. vulgare* flowers can kill *I. multifiliis* trophonts and theronts with inhibition of tomont reproduction.

MATERIALS AND METHODS:

Collection of cow urine distillate and potash alum:

The cow urine distillate is collected from Gou Shala Kendra, Amravati and potash alum was collected from the market.

1. Collection of diseased fish:

Diseased guppy fishes and gold fishes were taken from home aquarium, infected with itch and white eye disease. Ich disease was confirmed by the following symptoms observed in the fish like white spot on the body and fins and scratching against stones, loss of appetite. White eye fish had one eye complete white and fish was unable to capture food quickly.

2. Acclimatization:

The next step followed was acclimatization. Acclimatization is the process in which an individual organism adjusts to change in its environment (such as change in pH, humidity, or temperature), allowing it to maintain performance across a range of environmental condition.

3. Treatment with potash alum and cow urine :

Bath treatment of potash alum and prolonged treatment of cow urine was given to fishes.

➤ Bath treatment of potash alum-

A popular means of medicating fish is to place a chemical or medicine into the water with a fish. This method of delivering a medication is called a bath treatment. The short-term bath treatment is used in this the fishes are subjected to a moderate chemical concentration for a short period of time, ranging from 15 minutes to hours. This is an excellent method for administering many medications to fish kept in aquaria. The different concentration of potash alum was mixed in water for treatment i.e. 0.1g/L, 0.2g/L, 0.3/L, 0.4g/L and 0.5g/L of water.

Treatment was given up to 5 days for 15 mins twice a day.

➤ Prolonged treatment with cow urine:

The cow urine is administrated directly into the aquarium. This type of treatment is called prolonged bath. It means, small concentration of chemical are applied and left in the water on permanent basis. Cow urine is added in varying proportion as 1ml, 1.2ml, 1.3ml, 1.4ml and 1.5ml in 1-liter water in aquarium.

OBSERVATIONS:

Observation for treatment on white eye disease with Potash Alum.

RESULT AND DISCUSSION:

Cow urine distillate and potash alum were used for treating infected fishes with ich and white eye disease. Cow urine distillate of concentration 1.5 ml in 1 liter of water, in prolonged bath treatment gave satisfactory disappearance of ich, in 48 hours with the disappearance of white spot. Another remarkable changes were observed as increased movement of fins and retaining the morphology of fins that were deformed due to ich. 0.5g potash alum in one liter of water showed prominent activity for white eye. The complete white eye of fish faded in 3 days of bath treatment for 15 minutes twice daily. Eye became almost clear within 5 days by same treatment. With the clearance of white eye, there was promptness in activities of fish such as capturing of food and avoidance of obstacles. The treatment of formalin, copper sulphate, potassium permanganate and salts are listed in treatment of disease. Present study was focused on use of non-toxic, cost effective and easily available material for treating the disease. The use of formalin is

restricted for treatment as the concentration should be given very accurately otherwise it causes adverse effects on fishes, again handling of formalin is troublesome because fumes are dangerous and can damage mucosal lining of nose and throat. [14] Copper sulphate treatment causes killing of algal blooms in ponds and this leads to low oxygen condition and fishes may become stressed or die as a result. Use of potassium permanganate is not effective due to sensitivity of many kinds of fishes towards it.[4] Salts is used as one of the best treatments against ich [11] but use of it is not cost effective for large ponds. White eye disease is usually treated by using varieties of antibiotics but use of antibiotics is harmful by ecological point of view and they are costly and hence not affordable to farmers to use in their farms. Hence the use of cow urine distillate and potash alum for treating ich and white eye is a way of non-toxic, easily available and cost-effective treatment for curing disease in short duration of time.

CONCLUSION:

Treatment with potash alum for white eye disease in guppy fish and goldfish proven effective and showed cure in very short duration. Cow urine distillate proved effective against ich disease used for prolonged treatment in aquarium water. The effects of cow urine on different stages of *Ichthyophthirius multifiliis* remained unstudied and hence the study on prevention of contamination to other fishes was not worked out. No other adverse effects were observed among fishes during and after treatment. As potash alum and cow urine have no toxic effects on human handling them and on flora and fauna of ponds can be used as cheap and

eco-friendly treatment for fishes. Studies are needed to check this treatment on other edible fishes on large scale in ponds.

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Observation for treatment on Ich disease with cow urine: Before treatment:



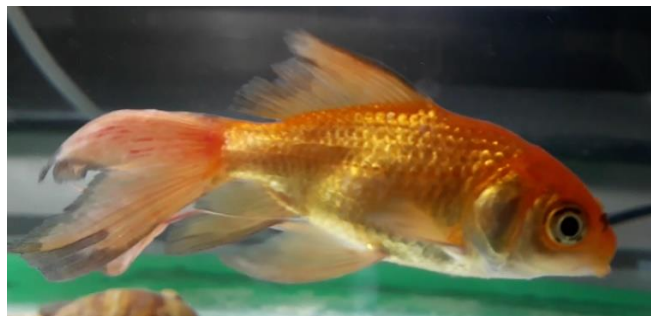
Before treatment



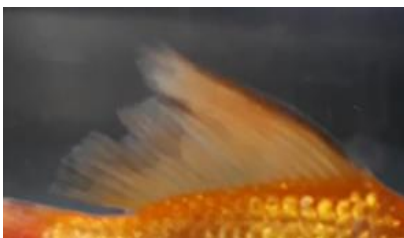
After treatment



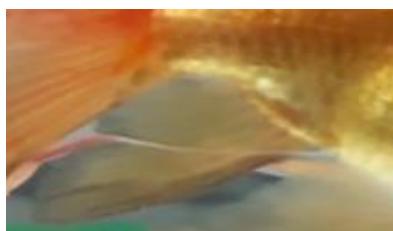
Before treatment



After treatment



a. Ich on dorsal fin



b. Ich on caudal fin



c. Ich on anal fin



Disappearance of Ich on dorsal fin, caudal fin and anal fin.