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Therapeutic performances of some selected aqua drugs

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Abstract

This study was carried out at the Disease Laboratory of the Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh, Bangladesh to verify the therapeutic performances of six commercial aqua drugs; three doses were selected as less than recommended, recommended and more than recommended to assess their performances. Before starting therapeutic experimental nine climbing perch (*Anabas testudineus)* and six stinging catfish (*Heteropneustes fossilis)* were confirmed as diseased ones by their clinical signs. The backswimmers (*Notonecta glauca*) were collected from faculty of fisheries pond and fish louses (*Argulus* sp.) were collected from tilapia fishes. Effective doses and their performances were determined on the basis of desired water quality change and clinical signs. It was found that all the drugs performed better at more than recommended doses as follows Aqua Ox performed better at the rate of 0.2 mg/l, GR Plus, 0.0005 ml/l, ID Plus (5%), 0.00026 ml/l; Active Blue, 0.0002 ml/l; Hashpoka Killer, 0.0001 ml/l; and Para Control, 0.001 ml/l. So these doses were suggested as recommended doses.

Keywords: Aqua drugs, therapeutic, performances, infection

INTRODUCTION

Aquaculture in Bangladesh is under heavy expansion. In aquaculture as in all food production sectors, one of the external imputes required for successful fish production is aqua medicine (Alderman *et al.* 1994). Aqua medicines are also important component in health management of aquatic animal, pond construction, soil and water management, improving natural aquatic productivity, transportation of live fish, feed formulation, manipulation of reproduction, growth promotion and processing value enhancement of final product etc. (GESAMP 1997). With the expansion of aquaculture in Bangladesh, there has been an increasing trend in using more medicine in aquatic animal health management. Aqua-medicine is indeed essential ingredients to successful aquaculture, which has been used in various forms for centuries (Subainghe *et al.* 1996).

The proper management of pond water quality plays a significant role for the success of aquaculture operations (Mayer 2006). The reproduction, growth, and developing of the fish are carried out in the water, therefore, there should be a better water quality to ensure the fish to grow and develop, it is very important for fish (Wang *et al.* 2009).

Each water quality parameter alone can directly affect the animal's health. Exposure of shrimp and fish to improper levels of dissolved oxygen, ammonia, nitrite or hydrogen sulfide leads to stress and disease. However, in the complex and dynamic environment of aquaculture ponds,

water quality parameters also influence each other (Mayer 2006).

In the USA and in most of Europe use of drugs is controlled by drug licensing supported by a surveillance program to monitor the active ingredient and the recommended dose and dosage. Since these are relatively new controls, their level of enforcement may vary in different region, but proper enforcement will be the basis of consumer protection. Where regulations are lacking or weak like Bangladesh, the drug of choice is determined by cost, availability and efficacy.

Thus, many problems have been arisen associated with using of aqua medicines. Many marginal farmers face the lack of efficacy of aqua-medicine. They are not truly benefited through the using the recommended dose of aqua-medicine from different pharmaceutical companies. Many pharmaceutical companies are write dose and dosage of their product without any research and many chemicals may persist for many months in aquatic system, retaining their biocide properties. Some antibacterial, notably oxytertracycline, oxolinic acid and flumequine, can be found in sediments at least six months following treatment (Weston 1996).

Many Aqua drugs commonly used for fish are sold by different companies; therefore, the percent of active ingredient will vary from product to product. Poor farming practices, including those that cause water pollution and other negative impacts on the environment- as well as the over use of chemicals and antibiotics are bad news. So different concentrations of the selected antibiotic are tested against various bacteria in order to determine what concentration will work best against these bacteria.

The purpose of these measurements is to determine how long the antibiotic stays active in the body of the fish and whether or not the concentration in the body is high enough to kill or inhibit bacteria. So need to provide fish the actual percentage of antibiotic that is active in the product and calculate dosage accordingly.

Since the launch of aqua medicine few researches have yet been undertaken. In this point of view, it is necessary to evaluate the risks associated with aqua-medicine and establish the standard dose and dosage of aqua-medicine for the development of water quality and fish health management.

Drugs of Aquaculture International Co. Ltd., Bangladesh are popular throughout greater Mymensingh for effective fish health and water quality management. The present study was carried out to check the efficacy of drugs of Aquaculture International Co. Ltd., Bangladesh for following mentioned objectives- to verify the therapeutic performances of aqua drugs for developing the water quality and disinfectants, to cross check the suggested doses and dosages of the drugs and to identify the problems associated with their doses.

METHODOLOGY

The experiment was carried out in the Disease Laboratory of the Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh, Bangladesh. The research work was undertaken in 12 glass aquaria (average capacity 30 liter), the aquaria were checked carefully for any leak. After that each aquarium was filled with 30 liter of tap water and 30 liter of pond water. Each aquarium was provided with aerator for continuous oxygen supply. Six aquaria were used for treatment of selected aqua drugs. An adequate level of dissolved oxygen in each aquarium was maintained through artificial aeration during the experimental period.

Diseased climbing perch (*Anabas testudineus*), the stinging catfish (*Heteroneustes fossilis*) the backswimmer (*Notonecta glauca*) and fish louses (*Argulus* sp.*)* were selected for the experiment. Diseased fish were collected from the ponds of the Faculty of Fisheries of Bangladesh Agricultural University campus and nearby fish farms; after collection those were carefully transported to avoid physical injury. The backswimmers were collected from the experimental ponds and fish louses were collected from naturally infected diseased Tilapia (*Oreochromis niloticus*) fishes from different places of Mymensingh district.

There were six aqua drugs used in this study *viz*; Aqua Ox for increasing the oxygen level, G. R. Plus for maintaining the ammonia level, ID Plus (5%) and Active Blue as disinfectants and Para Control or Hashpoka Killer as parasite killers (Figure 1).

Water quality parameters were evaluated before and the resultant parameters, after doses aqua drugs treatment with a certain time interval were conducting the experiment. On the basis of resultant water quality change, the efficiency of the drugs was worked out and requisite doses were determined. The measurement of water quality and sample collection dissolved oxygen was measured done between 28 hours at 2 hour's time intervals, and measured ammonia by 8 hours 1 hour intervals by using different testing kits and instrument. Ammonia (mg/l), dissolved oxygen (mg/l), pH and temperature were measured.

Determination of disinfectants were conducted to investigate, in laboratory condition, the two products ID plus (5%) and Active Blue those were strong disinfected

performances against bacteria and fungus causing infectious diseases. In climbing perch (*Anabas testudineus)* was collected from south side of Faculty of Fisheries pond, BAU campus and stinging catfish (*Heteropneustes fossilis)* were collected from local fish farm. Fish were acclimatized for 3 days in laboratory condition.

Figure 1: Six aqua drugs of Aquaculture International Co. Ltd., Bangladesh

Calculation of recommended doses

Aqua Ox (mg/l) = $\frac{500x1000}{12000x100x3}$ =0.1389

G.R. Plus (mg/l) = $\frac{12}{12000 \times 3}$= 0.0003

ID Plus (5%) (mg/l)=$\frac{5}{12000 \times 3}$= 0.000139

Active Blue (mg/l)= $\frac{5}{12000 \times 4}$= 0.000104

Hashpoka Killer (mg/l) =$\frac{3}{12000 \times 3}$= 0.000083

Para Control (mg/l) =$\frac{1000}{12000 \times 33x3}$= 0.000843

1 decimal volume =12m^3 volume = approximately 12000 liter holding capacity water (Kumar *et al.* 1992)

RESULTS

Performance of Aqua OX: During the experiment, the highest dissolved oxygen concentrations were 5.33 mg/l, 6.50 mg/l, and 6.67mg/l, for lower, recommended, and higher dose of Aqua OX respectively (Figure 2).

Performance of G.R. Plus: The ammonium content in water of the observed aquariums was found to be 5 mg/l before the use of drug. The mean value of ammonium content was 3.0±0.00, 0.83±0.17 and 0.5±0.00 mg/l after 8 hours the use of G.R. Plus (Figure 3). In similarly Mahmud (2011) and Faruk (2013) also found the mean value of ammonium content was 3, 2.5 and 2 mg/l respectively lower, recommended and higher dose of JV Zeolite, Bio aqua-50 and Zeolite gold.

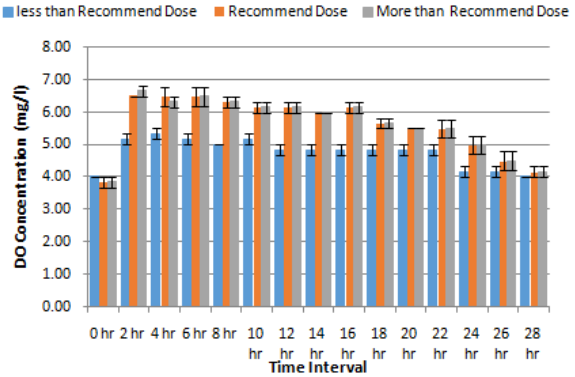

Figure 2: Mean value of dissolved oxygen concentration during Aqua Ox treatment

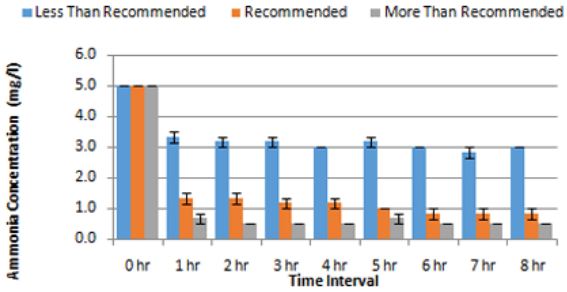

Figure 3: Mean value of ammonia for G.R. plus treatment

Performance of ID Plus (5%): Gross clinical features of the diseased fish before and after used ID Plus (5%). During the study period, the average temperatures were recorded 31°C in therapeutic trial. Before therapeutic trial the disease fish were observed gross clinical pathology. Diseased *A. testudineus* infected with bacteria showed the various features presented in Table 1 and Figures 4-5.

Figure 4: Infected *Anabas testudineus* before treated with ID plus (5%)

Performance of Active Blue: Gross clinical features of the diseased fish before and after treatment Active Blue. Different features of Stinging catfish (*H. fossilis*) infected with some pathogen are showed in Table 3, and Figures 6-7.

Table 1: Clinical features of *Anabas testudineus*, before and after the treatment by ID Plus 5%

Clinical signs	T1			T2			T3		
	F1	F2	F3	F4	F5	F6	F7	F8	F9
Before treatment									
SHL	1	3	3	2	3	3	2	3	2
EAFR	2	2	3	2	2	2	1	3	1
LDRH	1	3	3	2	2	2	2	2	2
DCB	1	3	2	2	2	2	1	2	2
LS	0	2	3	2	2	2	1	2	1
DBC	0	1	1	0	0	0	1	0	0
After treatment									
SHL	1			2	2	2	2	1	2
EAFR	2			2	2	2	1	2	1
LDRH	1			2	1	1	2	2	2
DCB	1			2	2	2	1	2	1
LS	0			1	2	1	0	2	2
DBC	2			2	2	2	1	2	2

SHL, Skin with hemorrhagic lesion; EAFR, Erosion of anal and fins region; LDRH, Lesion on dorsal region and head; DCB, Deformed and curved body; LS, loss of scales; DBC, Darkening body color; 1, low; 2, moderate; 3, high; 0, absent; clinical signs; T1, Less than recommended dose; T2= recommended dose; T3= more than recommended dose; F1-F9 = Sample diseased fish

Table 3: Clinical features of the diseased *Heteropneustes fossilis*, before and after the treatment by Active Blue

Clinical Signs	T1		T2		T3	
	F1	F2	F3	F4	F5	F6
Before treatment						
SHL	2	2	1	2	2	1
EDCF	2	1	2	0	0	2
AM	2	1	2	1	1	1
LDRH	2	2	1	1	1	2
BWC	2	1	1	2	3	1
FRC	1	2	3	2	3	2
After treatment						
SHL	2	2	1	1	1	1
EDCF	2	1	1	0	0	2
LDRH	2	2	1	1	1	1
BWC	2	1	1	1	2	1
FRC	1	1	2	1	1	1

SHL, Skin with hemorrhagic lesion; EDCF, Erosion of dorsal and caudal fins; AM, Abnormal movement; LDRH, Lesion on dorsal region and head; BWC, Body whitish color; FRC, Fins reddish color; 1, low; 2, moderate; 3, high; 0, absent; clinical signs; T1=Less than recommended dose; T2 = Recommended dose; T3 = More than recommended dose; F1-F6 = Sample of diseased H. fossilis

Figure 5: Photographs of cured *Anabas testudineus* after treated with ID plus (5%) at different doses

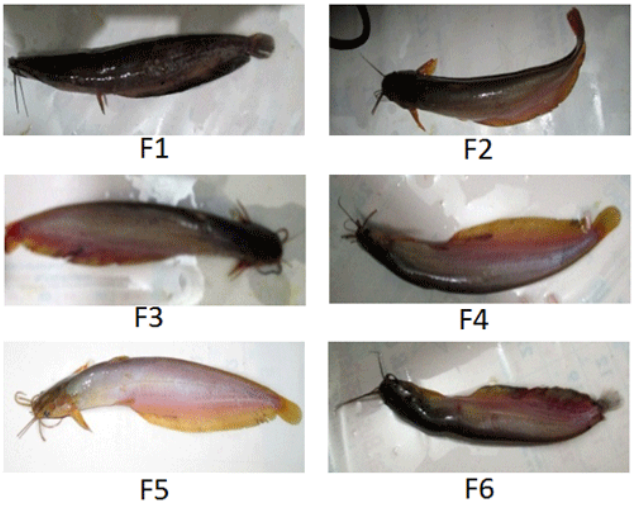

Figure 6: Photograph of infected *Heteropneustes fossilis* before treated with Active Blue at three different doses

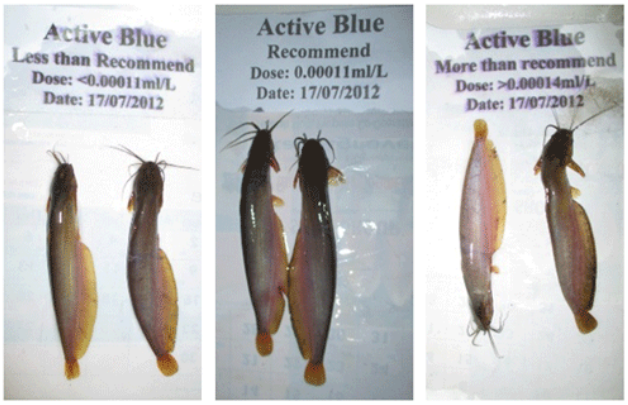

Figure 7: Photograph of cured *Heteropneustes fossilis* after treated with three different dose of Active Blue

Performance of Hashpoka Killer: During the study period the temperature the average temperature was recorded 32°C Dissolved Oxygen were recorded 5.5 mg/l and pH was 7.8 before therapeutic trial of Hashpoka killer. The observation time was 30 minutes (Table 4).

Table 4: Performance of therapeutic trial of Hashpoka Killer

Issues	*Doses (ml/l)*		
	T1	*T1*	*T1*
No. BS A	300	300	300
No. BS D	214	278	289
No. BS S	86	22	11
% BS D	71.33	92.67	96.33

No. BS A, Number of Backswimmer applied; No. BS D, Number of Backswimmer died; No. BS S, Number of Backswimmer survived; % BS D, Percentage of Backswimmer died; T1=Less than recommended dose; T2 = Recommended dose; T3 = More than recommended dose

Performance of Para Control: During the study period the temperature the average temperature was recorded 31°C Dissolved Oxygen were recorded 5 mg/l and pH was 7.5 before therapeutic trial of Para control. The observation time was 30 minutes. Different results related to this observation are presented in Table 5.

Table 5: Performance of therapeutic treatment of Para Control

Issues	*Doses (ml/l)*		
	T1	*T2*	*T3*
No. A A	3	3	3
No. A D	2	3	3
No. A S	1	0	0
% A D	66%	100%	100%

No. A A, Number of Argulus sp. applied; No. BS A, Number of Argulus sp died; No. A S, Number of Argulus sp. survived; % A D, Percentage of Argulus sp. died; T1=Less than recommended dose; T2 = Recommended dose; T3 = More than recommended dose

During the experiment, the highest dissolved oxygen concentrations were 5.33 mg/l, 6.50mg/l, and 6.67mg/l, respectively lower, recommended, and higher dose of Aqua OX. According to the study of Hossain (2000), Kohinoor (2000), Begum (2003) and Alim (2009) the dissolved oxygen content varied from 3.8 to 6.9 mg/l, 2.04 to 5 mg/l, 3.50 to 7.50 mg/l, 2.15 to 6.74 mg/l and 1.62 to 8.6 mg/l, respectively.

The ammonium content was observed 3.0±0.00, 0.83±0.17 and 0.5±0.00 mg/l after 8 hours the use of G R Plus. Faruk (2013) also found the mean value of ammonia content was 3.20mg/l, 2.60mg/l and 1.90 mg/l after 3 hours the use of Zeolite gold.

The best result was obtained with 100% recovery of infected fish when the disinfected, ID plus (5%) was used at a higher dose (0.00026ml/l) and recommended dose (0.00013ml/l) and lower dose than recommended dose (0.00007ml/l) showed two fish were not recovered in laboratory condition. And ID plus (5%) was used at a higher dose (0.00026ml/l) and recommended dose (0.00013ml/l) and lower dose than recommended dose (0.00007ml/l) showed two fish were not recovered in laboratory condition.

Hashpoka Killer resulted in 71.33%, 92.67%, 96.33% mortality at 0.00005ml/l, 0.000083ml/l, and 0.0001ml/l. Para Control for 19 minutes was found to be 100% effective in killing *Argulus* sp. at recommended dosage (0.000843ml/l).

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