

Present status of Aqua-medicines Used for Fish Culture at Shantahar and Adamdighi of Bogra District, Bangladesh

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Abstract: In order to investigate the present status of aqua-medicines used in various aquaculture activities in Bogra district, Bangladesh a survey was conducted with fish farmers and representative of pharmaceutical companies from December, 2011- to May, 2012 (180 days). The study showed that fish farmers were found to be used a wide range of aqua-medicines for aqua health management and for pond and water quality management. Zeo-fish, Zeo-prime, Ecolite, Megazeo plus etc. Tesmin, Emsen, Polgard, Virex are widely used toxic gas remover. Other than these, farmers were found to use several traditional aqua-medicines for aqua-health management, those included Potassium permanganate, Formalin, Salt, Lime, Melathion, Bleaching powder etc. Forty pharmaceutical companies have been recorded to market these products. Most of the products have been marketed from different countries like USA, Thailand, Malaysia, Belgium and China. Prices were variable, but seemed to be affordable by the aqua farmers. The present investigation pointed out several constraints associated with the use of such aqua-medicines, including lack of technical knowledge of farmers about use of aqua-medicines.

Key words: Aquaculture, antibiotic, disease, disinfectant, pond

I. Introduction

Aquaculture is one of the most important sectors which plays a significant role in the economy of Bangladesh in term of food, nutrition, income, employment and foreign exchange earnings. In Bangladesh aquaculture is rapidly spreading in recent years, but cannot fulfill the target production for many constraining factors. Fish disease is one of the most alarming factors. Aqua medicines are indeed essential ingredients to successfully managed the aquaculture, which has been forms for centuries^[1]. Use of drugs for the management of aquaculture is widely recognized. These are essential components in pond construction, health management, soil and water management, enhancement of natural aquatic productivity, transportation of live organism, feed formulation, manipulation, enhancement of production, growth promotion and processing value enhancement of final product^[2,3].

There are several aqua-medicines were used in aquaculture for health management. These included sodium chloride, formalin, malachite green, methylene blue, potassium permanganate, glutaraldehyde and tryfliralin^[4,5,6,7]. Other popular traditional aqua-medicines included Zeolite, EDTA, Gypsum, Lime, Alum were used for the purpose of pond soil and water quality management. These are widely used to neutralize acidity, increase total alkalinity, increase hardness in the soil and water of grow out pond, reduce turbidity in ponds, chalets divalent and trivalent metal cations etc. Aquaculture in Bangladesh is expanding rapidly as well as trends of using more aqua-medicines in aqua-health management. Most of the farmers do not know the appropriate dosage and methods of application. It has been realized that farmers were using these aqua-medicines without knowing their efficacy. This is due to lack of information regarding the present status and consequences of aqua-medicines using in aqua-health management. Considering the above facts, the present study was conducted to identify new types of aqua-medicines used in aqua- health management; to know purpose of using, appropriate dosages and method of application of aqua-medicine and to identify the problems of using aqua-medicine.

II. Materials And Methods

2.1 Selection of the study area

The study was conducted in two regions of Bogra district namely Shantahar and Adamdighi, Bangladesh (Figure 1) during the period of December 2011 to May 2012 (180 days).

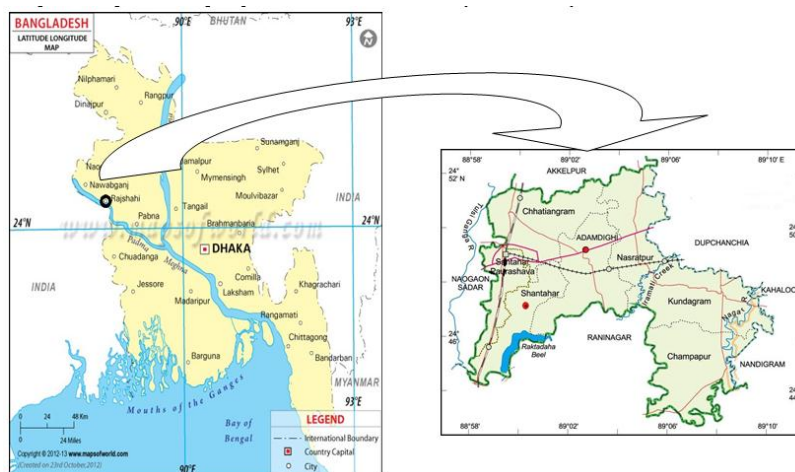


Figure 1. Maps indicating study areas. Closed circle and arrow denotes sampling site (Adamdighi and Shantahar)^[8].

2.2 Collection of data

According to the objective of the study a questionnaire was prepared to collect the expected data. Data were collected from different target groups to have an overall picture of the aqua-medicines used in aquaculture activities in this area. Data were collected by direct interviews with farmers, representative of pharmaceutical companies and aqua-medicine seller. Each responded was given a brief introduction about the nature and purpose of the study during the interview. They were asked the questions systematically in a very simple manner with explanation and necessary information was recorded.

2.3 Methodology

From the list of huge number of new aqua-medicines found in market the first attempt was made to find out all those new product used by farmers in the different aspects of their need as for water quality management, disinfectant, toxic gas reducer, stress remover and as immunity increaser. All attempts were made to find out the popular aqua-medicines for aquaculture health management in field level. And finally aqua-medicine producing pharmaceutical companies were enlisted in the investigation report.

2.4 Data analysis

The data were analyzed using tabular and descriptive statistical techniques. The summary tables were prepared in accordance to the objective of the study. The technique of analysis included the classification of tables into meaningful by arithmetic mean, percentage and ratios.

III. Results

3.1 Different types of aqua-medicines: benefits and their mode of action

Aquaculture in Bangladesh is increasing rapidly. For sustainable production different types of aqua-medicines were found to be used at different stages of aquatic animal health management as growth promoter, oxygen supplying supporter, disinfectants, immunity increaser, toxic gas remover, stress remover and antibiotics for disease treatment.

3.2 Available new zeolite in market and field level: Benefits and mode of action

A wide range of aqua-medicines were seen to be used during pond preparation and water quality management by the farmers (Table 1). Among them Zeo-Fresh, Zeo Prime, Ecolite, Megazeo plus were widely used in field level. The active ingredients of such aqua-medicines are SiO_2 , Al_2O_3 , Fe_2O_3 , CaO , Na_2O etc. They use these for controlling water & soil pH, absorbing NH_3 , H_2S and other noxious toxic substance, controlling growth of plankton, increasing resistance towards disease, ensuring bio-security, increasing dissolve oxygen, controlling water color and removing turbidity.

Table 1: Zeolites: For pond and water quality management.

Sl. No.	Name	Name	Active ingredient	Dosage	Price (Tk.)
1	Zeo Fresh	Square	SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ CaO, MgO, Na ₂ O, LOI	24 Kg/acre	40/Kg
2	Zeolite Gold	Fish tech	SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ CaO, MgO, Na ₂ O	400-500 g/dm	50/Kg
3	Aqualite	Century	SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ CaO, MgO, Na ₂ O, K ₂ O, TiO ₂	20-25 Kg/acre	50/Kg
4	Pond lite		SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ CaO, MgO, Na ₂ O	20-30 Kg/acre	50/Kg
5	Ecolite	Eon	SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ CaO, MgO, Na ₂ O, K ₂ O, Mn, P	7 Kg/33 dm	50 /Kg
6	Zeo prime	SK+F	SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ CaO, MgO, Na ₂ O, TiO ₂ , K ₂ O	6-8 Kg /33 dm	50/Kg
7	Geotox	Novartis	SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ CaO, MgO, Na ₂ O	20-25 Kg /100 dm	55/Kg
8	Mega Plus	Zeo ACI	SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ CaO, MgO, Na ₂ O, K ₂ O, Mn	25 Kg /100	50/Kg

The mixture of SiO₂, Al₂O₃, Al₂O₃, CaO etc. which together form minute pore and sponge like structure. Different types of toxic gases like NH₃, H₂S and harmful pathogen become trapped in the pore of such compounds.

3.3 Available new disinfectants in market and field level: benefits and mode of action

Disinfectants are very important and widely used by the farmers (Table 2). The most popular disinfectants are Timsen, Emsen, Virex, Aquakleen etc. The benefits of disinfectants are to prevent different types of bacterial, fungal and viral diseases like gill rot, tail rot, dropsy etc. to maintain hygienic condition in hatchery equipment & floors and in some cases use to treat disease.

Table 2. List of available new disinfectant in market and field level.

Sl. No.	Trade Name	Company	Active ingredient	Dosage	Price (Tk.)
1	Polgard	Fish Tech BD	3 methyl, 4 Alkyl two chain brominated compounds	500 ml/acre	200/200 ml
2	Virex	ACI	Potassium peroximono sulphate 50%	100-150 g/33 dec	400/100 g
3	Virofore		Iodine 2.8%	100 ml / 33 dec	100/100 ml
4	Aquakleen	Square	Tetradecyl Tri-methyl Ammonium bromid, BKC	0.5-1 l/acre	300/1
5	Timsen	Eon	n-alkyl dimethyl benzyl ammonium chloride+ stabilized urea	20 g/33 dec (For prevention) 80 g/33 dec (For Treatment)	260/50 g
6	Emsen	Ethical	n-alkyl dimethyl benzyl ammonium chloride+ stabilized urea	80 g/33 dec	255/50 g

3.4 Available new toxic gas reducer in market and field level: benefits and mode of action

Several aqua-medicines were found in the aqua-medicines shops that were reported to be used as toxic gas reducer (Table 3). The available toxic gas reducer were gastrap, gas stop, gasonex plus, ammonil. The active ingredients of such medicines were mainly sodium lorile ether sulphate, aluminum hydroxide, silicon di oxide, bacillus subtilis, lactic acid etc. The price found to be quite affordabe by the commercial aqua farmers. Benefits of using toxic gas reducer are to remove the toxic gas like NH₃, H₂S, CO₂, etc. from the bottom of pond, to reduce concentration of ammonia and to remove off odor of water and create hygienic condition in pond.

Table 3. List of available toxic gas reducer in market and field level.

Sl. No.	Trade Name	Company	Active ingredient	Dosage	Price (Tk.)
1	Gastrap	Square pharmaceuticals Co Ltd.	Lactic acid <i>Bacillus</i> sp. <i>Bacillus subtilis</i> Cellulase, Hemicellulase, amylase	200 mg/acre	3000/ Kg
2	Gas stop	Organic pharmaceuticals Co. Ltd.(BD) Co. Ltd.	<i>Bacillus subtilis</i> Al ₂ O ₃ SiO ₂	500 mg/acre, 3 weeks	2500/Kg
3	Gasonex plus	Fish tech. (BD) Co. Ltd.	Na-lorile ether sulphate	200-400 mg/Kg Zeolite	2950/Kg
4	Pond D tox	Fish tech.(BD) Co. Ltd.	Pracoccus pantotrophus	4 ppm	2800/Kg
5	Aqua Magic	Fish tech.(BD) Co. Ltd.	<i>Azotobactor chorococcum</i> , <i>Bacillus subtilis</i> , <i>candida utilis</i>	5 Kg +100 g sugar +250g rice bran mixed with 10 liter water	2700/kg
6	Ammonil	Noverties Pharmaceuticals Co. Ltd.	Yucca plant extract, <i>Bacillus subtilis</i> , <i>candida utilis</i>	100-200 g/acre	2800/kg
7	Bio-Aqua-50	Eon animal health Co. Ltd.	Yucca plant extract, Saponin	60-70 ml /33 dm	2900/kg

3.5 Available new stress remover in market and field level: benefits and mode of action

Several aqua-medicines were found in the market using as stress remover (Table 4). The available stress remover were cevit aqua, ossi-c, osmosaline, aqua-c etc. The active ingredients of such medicines were mainly l-ascorbic acid (Vit-C), oxolinic acid, bitaglucan(Vit-C), calcium 80 mg (Vit-C) 200mg, ascorbic acid 50 g (Vit-C), natural betain. Benefits of using remover are for instant relief from any stress (transportation, over density heat shock, adverse environmental condition), for healing of wound and ulcers, for improving disease resistance, for reducing cannibalism and mortality, and fish becomes more active.

Table 4. List of available stress remover in market and field level.

Sl. No.	Name	Company	Active ingredient	Dosage	Price
1	Cevit Aqua	Square pharmaceutical Co. Ltd.	L-ascorbic acid (Vit-C)	For hatchery 0.5-2 g/t water, For pond 2-3 g /Kg feed	2000/Kg
2	Ossi-C	Fish Tech (BD) Co. Ltd.	Oxolinic acid, Bitaglucan (Vit-C)	For 4-5 g /Kg feed	1800/Kg
3	Aqua Cal-C	ACI pharmaceutical Co. Ltd.	Calcium 80mg (Vit-C) 200 mg	1Kg /Kg feed	1900/Kg
4	Aqua-C	ACI pharmaceutical Co. Ltd.	Ascorbic acid 50 g (Vit-C)	0.1-0.3 g/Kg feed	1700/Kg
5	Glucovet-Premix	ACME pharmaceutical Co. Ltd.	Vit-C	1-2 g/liter water	2000/Kg
6	Osmosaline	Eon Animal health Co. Ltd.	Natural Betain	1-2 g/5-10 liter water	1800/Kg

3.6 Available new immunity increaser in market and field level: benefits and mode of action

Several aqua-medicines were found in the aqua-medicine shops that were reported to be used as immunity increaser (Table-5). The available immunity increaser were resistol, charger gel, aqua cell etc. The active ingredients of such medicines were mainly Vit-C, Ca, P, Amino Nitrogen, Betain, 1-3 Glucan, Polysaccharix, Oligshacharix. Benefits of using immunity increaser are to prevent disease, provide boost immunity and reduce stress, increase survival rate, and to improve resistant towards disease.

Table 5. List of available immunity increaser in market and field level.

Sl. No.	Name	Company	Active ingredient	Dosage	Price(Tk)
1	Resistol	Square	Vit-C, Ca, P, Amino Nitrogen, Betain	5 ml/Kg feed	1150/1
2	Charger gel	Fish Tech	1-3 D-Glucan, Polysaccharides, Betaglucans	2-4 g/Kg feed	1200/1
3	Ossi-C	Fish Tech	Oxolinic acid Bitaglucan, Vit-C	4-5 g/Kg feed	1100/1
4	Aqu cell	ACI	Ca, P, Vit D3, habrs	1-2 g/Kg feed	1000/1
5	Ylkangsh	Advanced	Polysaccharix, Oligosscharix	0.05%-0.1%	1100/1

3.7 Problems associated with the use of aqua-medicines

During the present study some problems were identified which are summarized below as 1. aqua-medicines may persists and retaining their biocidal properties in aquatic system for longer period; 2. it may create problem for non-target species; 3. over doses may create toxic problem; 4. major concern the use of antibiotics in aquaculture involve the development and transfer of drug resistance to pathogenic bacteria from farm animal to human; 5. lack of technical knowledge of fish farmers about the use of aqua-medicines; and 6. lack of knowledge of fish farmers about residual effect and withdrawal period of aqua-medicines. Use of drugs and popularization assessment and percentages stated Table 6 and Table 7.

Table 6. Popular aqua-medicines in field level in use.

	Name	Company	Number of farmers Questioned	Number of farmers responded positively	Percent farmers respondent positively
Zeolite	Zeo-fresh	Square	20	5	25
	Zeo-prime	SK+F	20	5	25
	Mega-zeo plus	ACI	20	5	25
	Zeo-lite gold	Fish tech	20	5	25
Disinfectants	Timsen	Eon	20	8	40
	Emsen	Ethical	20	4	20
	Virex	ACI	20	4	20

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Stress remover	Polgard	Fish tech	20	3	15
	Cevit aqua	Square	20	8	40
	Osmosaline	Eon	20	5	25
	Aqua-C	ACI	20	5	25
	Ossi-C	Fish tech	20	2	10
Toxic gas reducer	Gasonex plux	Fish tech	20	7	35
	Ammonil	Novartis	20	6	30
	Gas trap	Square	20	4	20
	Bio-aqua 50	Eon	20	3	15
	Resistol	Square	20	9	45
Immunity increaser	Aqua cell	ACI	20	8	40
	Charger gel	Fish tech	20	3	15

Table 7. Number of products of different pharmaceutical companies.

Sl No.	Company Name	Number of products (N=150)	Products (%)
1	Organic	13	8.60
2	ACI	18	12.00
3	Rals Agro	12	8.00
4	Novartis	7	4.66
5	Eon	9	6.00
6	Fish Tech	17	11.33
7	Square	9	6.00
8	Advanced animal health	8	5.33
9	The ACME	12	8.00
10	Other 10 companies	46	30.08

IV. Discussion

Aquaculture has a significant role in the economy of Bangladesh. Over the last decade it has expanded diversified, intensified and technologically improved. The aquaculture activities in Bangladesh are influenced by a number of new aqua-medicines used for aqua-health management. The present study noticed a wide range of new aqua-medicines that were being marketed by various companies for aqua-health management. Fish health management and disease treatment were major area where farmers were seen to be used a lot of such aqua-medicines. EUS, tail rot, fin rot, red rot, white spot and dropsy were the major diseases found in studied areas. A number of authors also reported the similar conditions in aquaculture of Bangladesh^[7,9,10,11].

The present investigation showed that a wide range of new aqua-medicines that were being marked by various trade names which included Resistol, Ossi-C, Charger Gel, Cevit Aqua, Osmosaline, Gastrap, Gas stop etc. were widely used by the farmers for aqua-health management in field level. Farmers were also seen to be used several traditional aqua-medicines in aqua- health management included lime, salt, potassium permanganate, melathion, sumithion, formalin, rotenone etc. which is similar to the previous studies reported in aquaculture of Bangladesh^[5,7,11]. Farmers were seen to be used antibiotics for bacterial disease treatment. Most of the farmers do not follow the appropriate dosage during disease treatment. It is widely recognized the excessive use of antibiotics contributes the development of resistant strain of bacteria^[12].

At present 150 products of 40 animal health companies were seen to market and field level. Some aqua-medicines were found only trade names. Neither farmers nor seller did not have clear idea about the activate ingredient and method of application of the particular aqua-medicines though they were using those without hesitation. Only few companies provide details product profile to the farmers. It was found that same product of different companies were variable dosage. The pharmaceutical companies should take care about those products.

Most of the farmers were seen to be used antibiotics for bacterial diseases treatments indiscriminately. Some farmers were not following the described dosages for treatment. It is widely recognized that the excessive use of antibiotics contribute the development of resistant strains of bacteria^[12]. Therefore, it is important to follow the recommended dosages and method of application especially in the case of antibiotics.

Aquaculture is gradually a common practices in Bangladesh. Disease treatment in aquaculture can be a great value when used properly but when improperly applied can causes great loses of aquatic ecosystem. So, it is important to apply proper disease and best application methods for aqua-health management. Pharmaceuticals

companies should conduct more research and development towards reducing the harmful impact of aqua-medicine in aquaculture.

V. Conclusion

The investigation was conducted to know the present condition of aqua-medicine used in aqua-health management. Management is the main thing for having any production. Without proper management, it is really unexpected from aqua-culture to have production. Disease problem is an alarming factor for fish culture. Indeed aqua-medicines are essential components to avoid this problem. But excessive use of aqua-medicine is harmful for aquatic ecosystem. The present study on aqua-medicine pointed out some problems of using aqua-medicines. Unfortunately little attention has been paid on the documentation of aqua-medicines. As a result, there is a lack of information regarding the impact of those aqua-medicines. However, respective authority, policy maker, scientist and researcher should work together to reduce the negative impact of aqua-medicines.

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