

Status of drugs, chemicals and antibiotics usages in freshwater aquaculture activities at Jaintapurupazila of Sylhet, Bangladesh

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ABSTRACT/RESUME

Abstract: The study was conducted from March 2016 to October 2016 to understand the current status of drugs, chemicals and antibiotics used for health management at freshwater aquaculture activities in Jaintapur Upazila of Sylhet. Data were collected through questionnaire interview, market survey through the participation of fish farmers, sellers and representatives of pharmaceutical companies. The most common dose of lime, urea and TSP used by the farmers were 0.5-1 kg/40m², 80-150g/40m² and 50-100g/40m² respectively for pond and water quality management. Various categories of aqua drugs and chemicals were identified that were used for water quality management, disinfection, controlling DO level, disease treatment, antibiotics and growth promoter. EDTA, Bleaching powder, Timsen, Polgard, Aquakleen, Virex, Germill were widely disinfectant. Health management and disease treatment were the major activities and farmers were seen to use Trichlorfon 40%, Angrab, Spa, KMnO₄, Lime, Salt, CT-DOX, VitaX-C, Pond Safe, Deletrix etc. Mostly used antibiotics were Renamycin, Oxytetracycline 20%, Chlorsteclin, Oxy-D Vet, Aquamycin, Orgamycin 15%, Orgacycline 15% etc. Major active ingredients of those antibiotics were tetracycline, oxytetracycline, chlorotetracycline, amoxicillin, doxycycline etc. There were 47 pharmaceutical companies, including international, supplying more than 250 products in the study area. The study indicated umpteen problems associated with the use of chemicals, dose, times and methods of application which must be overcome for environmental and animal safety

I. Introduction

Aquaculture is the fast growing food production sector playing a significant role in the economy in term of food, nutrition, income, and employment and foreign exchange earning [25]. According to the latest available statistics world aquaculture production was 90.4 million ton by weight and US\$144.4 billion by value in 2012, including 66.6 million ton of food fish and 23.8 million tons of aquatic algae [9]. Aquaculture in Bangladesh is expanding rapidly. Chemicals are indeed an essential ingredient to successful aquaculture, which has been used in various forms for centuries

[26]. They are used in pond construction, health management, soil and water management, enhancement of natural aquatic productivity, transportation of live organism, feed formulation, reproductive induction, growth promotion and processing of final products [1,14]. Aqua drugs are essential in reducing pathogenic organisms and compensate the stressful condition on fish health, protect the disease outbreak and treatment [13]. Massive use of aqua-medicines may causes great harm to the aquaculture environment within a short period [1,21]. Some antibacterial notably oxytetracycline, oxolinic acid and flumequine can be found in sediments at least six months after

treatment [31]. Concepts on chemical uses in aquaculture and its impact, environmental protection and sustainable aquaculture practices have been rises throughout the last two decades [10]. Considering the above facts the present study was conducted to identify different types of chemicals used in aquaculture activities in north eastern region of Sylhet district of Bangladesh with its purpose, methods and dosages of application and assessing their problems upon using.

II. Materials and methods

The survey was carried out for eight months and was based on field survey where primary data were collected from farmers, carp poly-culture farmers, catfish farmers, tilapia farmers, chemical sellers and representative of different pharmaceuticals companies. The study represents the aquaculture drugs used mainly on Jaintapur Upazila in the northern region of Sylhet district.

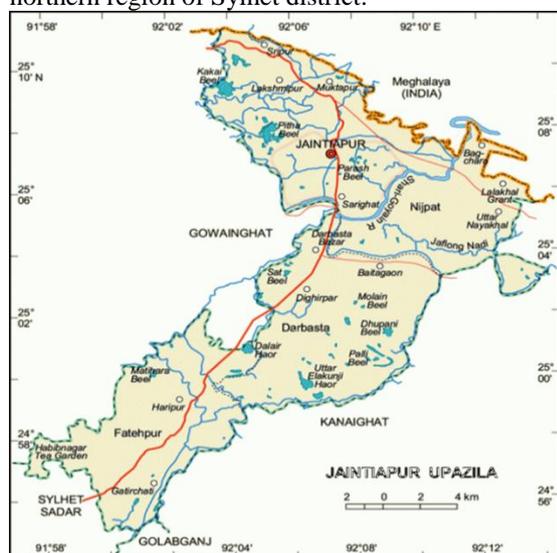


Figure 1. Jaintapur Upazila map adopted from http://photos.wikimapia.org/p/00/02/55/80/48_big.jpg

At first a set of questionnaire was prepared and pre-tested to verify the relevance of the questions and the nature of the sample producers. After pre-testing and necessary adjustment, a final set of questionnaire was developed. The questionnaire covered mainly farmer's profile, culture details, type of chemicals used with dose and price. Since aquaculture activities in the study area quite diversified, data were collected from different target group to have an overall picture of the drugs and chemicals used in aquaculture in this area. Data were collected from 150 pond owners randomly covering the selected study areas and 30 chemical sellers. For each category of farmers, five unions were selected depending on the intensity of fish farming for specific target groups. Then five farmers were selected randomly from each union.

The collected data were standardized and summarized carefully before the actual tabulation. Some of the data were collected into local units and those data were converted into international units. Then the data were input into excel sheet and analysis was done over Microsoft Excel.

Table 1. Sample size of the survey area

Target Group	Sample size
Tilapia and koi culturing farmers	30
Catfish culturing farmers	30
Carps culturing farmers	30
Poly/mixed culturing farmers	30
Chemicals. Drug sellers and marketing representatives	30

III. Results and discussion

III.1 Chemical and drug users

Tilapia, Koi and Catfishes are highly prone to different fungal, bacterial and viral diseases hence they need more chemical and drugs, approximately 92.3% Koi and Tilapia farmer, 89.1% Catfish farmer, 75.9% polyculture farmer, 69.5% Carps farmer used different chemical, drugs and disinfectants in their farm activities (fig.02). Chemicals usages are very rare or null in traditional and recreational farming activities which imply only 14%. Commonly used chemicals in freshwater aquaculture are lime, rotenone, various forms of inorganic and organic fertilizers, phostoxin, salt, dipterex, antimicrobials, potassium permanganate, copper sulphate, formalin, sumithion, melathion etc. [21,15, 6,8, 11].

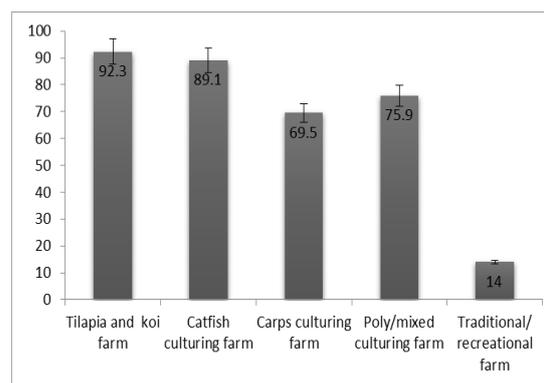


Figure 2. Percentages of different farmers using drug and chemicals.

III.2. Use of fish poison

Mainly rotenone is found to use by the farmer for eradication of predatory, wild and past fish from pond. About 33% farmers are found to be used rotenone as fish poison, which is very similar to the study about fish poison usages in Mymensingh area[28].

Table 1. Chemicals used as fish poison in study area

Chemicals		Dose (Kg/4046.86m ³)		Sources
Trade Name	Active Ingredients	Recommended	Used	
Hunter	Rotenone 9%	7.00	8-8.5	Eon Animal Health Products Ltd.
Aquanone	Rotenone and its isomers	7.20	8-8.5	Square Pharmaceuticals Ltd.
Acurote Gold	Rotenone 9%	8.00	8.00	ACI Animal Health Limited.

III.3 Doses of chemicals

About 70% farmers use lime during culture and prefer >0.5 kg/40m². A dose of 0.5-1 kg/40m² was also used by about 23% of the farmers during culture period. However, the higher dose of >1.5 kg was used by the farmers during pond preparation. A dose of urea at 80-150g/40m² was found to be used in most aqua-farm. Only 30.7% farmer used urea prior to pond preparation. Most of the farmers (60.3%) were not interested to use urea in running culture period. Most of the farmers prefer to use 50-100 g/40m² of TSP. The dose was used 65% farmers in pond preparation and 35% farmers in culturing period. The highest dose >100g/40m² of TSP was used by 14% farmers during culture.

III.4 Chemicals used as disinfectant

The chemicals widely used as disinfectants in aquaculture in the study area include Formalin, Lime, Bleaching Powder, Timsen, Malachite Green, EDTA, Virex, Etinol and Polgard Plus. Previous studies associated with aquaculture found disinfectants in his study such as Polgard Plus, Bactisal, Virex, Biogaurd, Lenocide, Timsen, Emsen, Aqua Cleaner Plus, Formalin and Bleaching Powder^[23]. Eon Animal Health Products Ltd. provides Timsen which is used as preventive measures for some bacterial, fungal and viral infections and formalin to control protozoan diseases in the study area. Timsen was effective to prevent some bacterial and fungal infections^[2]. Formalin are found to be active against a wide range of organisms, such as fungi, bacteria and ectoparasites^[4,16]. Commonly used chemicals in freshwater aquaculture activity are lime, rotenone, various forms of inorganic and organic fertilizers, phostoxin, salt, dipterex, antimicrobials, potassium permanganate, copper sulphate, formalin, sumithion, melathionet^[8,12].

III.5 Chemicals used to improve dissolved oxygen level

Farmers are reported to use different chemicals viz., Oxyflow, Oxymax, Oxy Plus, Bio Care, Bio-Ox, Oxy-Gold and Oxy-A to increase dissolve oxygen in fish ponds. Aqua drugs like Oxy- Gold, Oxy Life, Bio Care, Oxy Plus, Pure Oxy, Oxymax and Oxyflow increase dissolve oxygen in culture pond^[23]. Among those Oxyflow and Oxymax are effective to control hardness and poisonous gases. Oxyflow and Oxymax were used to remove hardness and poisonous gases^[2]. Oxyflow, Oxymax, Bio-Ox, Oxy-A and Oxy-Gold were also good in increasing dissolved oxygen in aquaculture pond^[20].

III.6 Chemicals used for disease treatment

Potassium Permanganate, Lime, Formalin, Salt, Bleaching Powder and Timsen were commonly used chemicals in aquaculture activity of the study area. Some previous studies also revealed that chemicals used in fish disease treatment included Potassium Permanganate, Lime, Formalin, Salt, Methylene Blue, Malachite Green, Melathion, Bleaching Powder and Timsen in aquaculture of Bangladesh^[06,08,11,21]. Ali^[2] and Rahman^[23] reported Lime, Salt, Potassium Permanganate, Sumithion, Melathion, Formalin and Bleaching Powder used as disease treatment. Treatment had a great value in aquaculture when chemicals are used properly^[29]. Rajib^[24] found indiscriminate use of drugs and chemicals in the coastal region of Bangladesh.

III.7 Antibiotics used for disease treatment

The study revealed 8 antibiotics with different trade name (Table 4). These antibiotics are mainly derivatives of oxytetracycline, chlortetracycline, amoxicillin, doxycycline etc. These antibiotics are effective against bacterial diseases. Excessive uses of antibiotics give rise to resistant strains of bacteria^[17]. Most of oxytetracycline and oxolinic acid in the aqua farm are subjected to lost in feed wastage and poor digestive absorption by fishes^[7].

III.8 Chemicals used for growth promoter

Megavit Aqua, Aqua Bost, Aqua Savor, Fibosol, Aqua Grow-P, Vitamix F Aqua, AQ Grow-G, Aquamin, ACmix Super-Fish and Aquamin Powder were the identified growth promoters available in the study area. The active ingredients of the mentioned products are Vitamin, Mineral, Amino Acid, Organic Acid, B-Glucan, Binder, Aloe Vera and Multivitamin. Ali^[2], Rahman^[23], Faruket *al.*^[12] reported the efficacy of those growth promoters. Moreover Aqua Savor and Aqua Grow-P were used against malnutrition as well as to improve health of fish.

III.9 Chemicals used as immunizer and stress compenstes

Vitex-C, Charger gel, Profs, Aqua photo, Ossi-C, Novio plus, Uni sense, Osmosaline, Aquaclear-S, BiominPondlife etc are found to be available immunizer and stress compenstes. Such medicines are formulated with Ca, P, Amino nitrogen, Betain, glucan, Polysaccharides, Beta-glucans, Oxolinic acid, Vit-D₃, Herbs and pro-biotic. Majority of chemicals used in aquaculture have detrimental after effect by their precipitations in water and sediment^[05,25,19,14].

III.10 Chemicals used as toxic gas remover

Available toxic gas reducers were Gastrap, Pond D tox, Gasonex plus, Ammonil, Zeolite etc. The active ingredients of such medicines were mainly sodium lorile ether sulphate, aluminum hydroxide, silicon di oxide, *Bacillus subitillis*, lactic acid etc. Islam^[18] also found drugs like Geotox, JV

Zeolite, Mega Zeo plus, Bio Aqua-50 and Ammonil used for improving water quality.

III.11 Manufacturer of aquaculture drugs in Bangladesh

During the study period it was found that 47 animal health companies either producing or marketing approximately 250 products targeting aquaculture. Among them majority of the products were produced by 11 companies like ACI Animal Health Ltd. (7.34%), Eon animal Health Product Ltd. (7%), Fish Tech BD (6%), Advanced Animal Health (5.67%), Novartis Animal Health Ltd. (5.66%), CP Aquaculture (5.66%), Square Pharmaceuticals Ltd. (4.33%), Organic Pharmaceuticals Ltd. (4%), Rals Agro Ltd. (4%), First Care Agro Ltd. (4%), Novartis (2.33%) and the rest 48.67% were supplied by the other companies. Faruk et al.^[12] recorded 33 pharmaceutical companies supplied various drugs and chemicals in Mymensingh district.

Table 3. List of available disinfectant in market and used by the farmer

Trade Name	Active Ingredients	Dose(per 4046.86m ² area)		Sources
		Recommended	Used	
Polgard	3 methyl, 4 Alkyl two chain brominated compounds	500 ml	450-600	Fish Tech BD.
Virex	Potassium peroxi mono sulphate 50%	100-150g	150-200	ACI Animal Health
Aquakleen	Tetradesail Tri-methyl Ammonium bromide, BKC	0.5-1.1	1.-1.5	Square Pharmaceutic als Ltd.
Pond Safe	Alkyldimethylbenzylammonium.Chloride Solution 80% Inert Ingredients 20%	500-600 ml (prevention) 600-800 ml (treatment)	660-100	Fish Tech BD.
Bleaching Powder	Chlorine	60 ppm	60ppm	Chemical seller
Timsen	n-alkyl dimethyl benzyl ammonium chloride+stabilized urea	20g/40m ² (prevention) 80g/42m ² (treatment)	30-90g/40m ²	Eon animal health products Ltd.
Germnil	BKC 50% with Glutaraldehyde	1-1.5 L		NAAFCO Pharma Ltd.

Table 4. List of available antibiotics in market and used by the farmers

Trade Name	Active Ingredients	Dose		Sources
		Recommended	Used	
Chlorsteclin	Chlortetracycline	200-300 g/100 Kg feed	250-300g/100 g feed	Novartis Pharmaceuticals Ltd.
Bactitab	Oxytetracycline 20%	50 g/kg body weight,	50g/kg body weight	ACI Animal Health
Oxy-D Vet	Oxytetracycline 20%+Doxycycline 10%	1 g/ 4Kg feed		Eon Animal health Products Ltd.
Orgacycline 15%	Chlortetracycline	200-300 g/10 kg feed	250-320g/10kg feed	Organic Pharmaceuticals Ltd.
Renamycin	Oxytetracycline	28-42 g/100 kg feed	35-50g/100kg feed	Renata Pharmaceuticals Ltd
Oxysentin 20%	OxytetracyclineHCIBP	100-200 g/100 kg feed,	150-200g/100kg feed	Novartis Pharmaceuticals Ltd.
Aquamycin	Chlortetracycline	1-1.5 Kg/ton (Treatment) 400-500g/ton feed (Prevention)		Fishtech (BD) Limited
Orgamycin 15 %	OxytetracyclineHCl BP (WSP)	prevention 60 gm/100 kg		Organic Pharmaceuticals Ltd.

IV. Conclusion

Considering the present situation it can be fairly predict that use of chemicals in aquaculture sector is expanding day to day. It is quite hard to recover all identified problems but there are some alternatives to minimize those problems. Involvement of trained fisheries graduate and training to farmers by GOs and NGOs are unavoidable means of reducing negative impacts. Policy makers, researchers and scientists should work together in resolving the problem regarding chemical use in aquaculture.

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