

Use of commercial aqua drugs and chemicals for fish production in Mymensingh district

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ABSTRACT

Fish health management was one of the major areas where aqua farmers used a lot of antibiotics and disinfectants. Various pharmaceuticals companies were found to provide these drugs and chemicals with different trade names to meet the farmers demand. The study was carried out to know the present status of use of commercial aqua drugs and chemicals and their impact on fish health. Data were collected through questionnaire interview with fish farmers, drug sellers, personal contact and market survey from selected area in Mymensingh district. Ten categories of drugs and chemicals were identified that have been using by fish farmers for different purposes. The categories included antibiotics, disinfectants, gas removal, oxygen supplier, vitamins and minerals, growth promoter, insect killer, algae killer, predator killer and pH balance. The companies included Fish Tech, Renata, Firstcare, ACI, ACME, Square, Samco, Novartis, Eon, Opsonin, Al Madina, Rals, Organic, Padma, Nature care, Advance and SK+F etc. Different types of fish diseases like epizootic ulcerative syndrome or EUS, tail and fin rot, red and white spot and dropsy in Shing (*Heteropneustes fossilis*), Koi (*Anabas testudineus*), Tilapia (*Oreochromis nilotica*) and Pangus (*Pangasianodon hypophthalmus*) were observed in the study area. Farmers used a lot of drugs and chemicals single or combined to overcome disease and health problems of their cultured fishes. Farmer got good recovery of disease after treating with drugs. During the field observation some problems were identified in using aqua-drugs which include poor understanding of farmers about the application of drugs, inadequate withdrawal period and some adverse effect on fish and human health.

Introduction

Aquaculture is one of the most important sectors which play a significant role in the economy of Bangladesh in term of food nutrition, income, employment and foreign exchange earnings. It is growing more rapidly than all other animal food producing sectors. Aquaculture in Bangladesh is also under heavy expansion currently and heading towards commercialization. Through invention and adaptation of new techniques and evolve of new culturable species this sector have got a dramatic diversification. However, different kinds of fish disease are the main obstacle of this potential sector and it considered as one of the major business risk.

To maintain proper health condition of fish, drugs and chemicals play a vital role. There are several causes of using drugs in aquaculture which include reducing the entrance of pathogenic organisms in culture area, reducing the multiplication of pathogenic organisms, reducing the stressful condition on fish health, reducing or protect the outbreak of disease and treatment of the disease (FDA, 2001). A variety of chemicals are used in aquaculture for fish health management. Some common chemicals include sodium chloride, formalin, malachite green, methylene blue, potassium permanganate, hydrogen peroxide,

copper compounds, glutaraldehyde and trifluralin (Plumb, 1992).

Concern is also growing over the use and potential misuse of some of aquaculture chemicals. The amount of information on chemical use in aquaculture and its significance for human health assurance, environmental protection and sustainable development of the sector, has been increasing throughout the last two decade (FAO/NACA, 1995; Plumb, 1995). In our country pesticides are also used in aquaculture of disease treatment, such as organophosphates, organotin compounds, rotenone and saponin. dichlofos, trichlorfon, diptarex, melathion, dursban are widely used organophosphate applied to control ectoparasitic crustacean infections in finfish culture. Due to high neurotoxicity of organophosphates, potential effects on health of fish farm workers are also health hazardous chemical (Alderman et al., 1994).

Application of chemical by aquaculturists, either for preventative or treatment purposes, a certain portion of the applied substance is released directly to the environment. With the expansion of aquaculture in Bangladesh, there has been increasing trend in using more chemicals in fish health management. Most of the farmers have only limited or no knowledge at all about the appropriate dosages and method of application.

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 know updated information of commercial aqua drugs and chemicals; and to study the impact of use of such chemicals on fish health at farmer level.

Materials and methods

Three upazilas like Muktagacha, Fulbaria and Fulpur of Mymensing district were selected for the present study.

Questionnaire survey

Fish farmers, hatchery and nursery owner, farm workers and chemical retailers were questioned individually. A set of preliminary questionnaire based on the objectives of the study was prepared. Major topic of questionnaire were the name of chemical, active ingredients, purpose of use, method of application and dose, duration, source, effects on environment, price, impact on health and productivity etc. In addition data on farming practices, general farm management, health and disease problems, seasonality, mortality etc were also gathered. For the interview, simple random sampling methods were followed.

Drug samples

Drug used for management and production of fish by the farmers were collected from local market of the study areas. The drugs of different companies were collected.

Fish health and disease investigation

In addition with the field observation, fish health and disease condition were verified through clinical and histopathological analysis. Fish were examined clinically through observing gross signs, abnormalities, lesions and erosions and external parasites.

Histological observation

For histopathological study, monthly sample was collected from fishes of selected farmer's pond and various organs such as skin, muscle, gill, liver and kidney by a sharp scalpel and forceps. Skin and muscle were collected from the place between anterior part of dorsal fin and lateral line and gills samples were collected by removing operculum. For liver and kidney, fishes were dissected and then portions of liver and kidney were collected. All collected samples were fixed in 10% natural buffered formalin and proceeded for preparing histological slide. The slides were then examined under a compound microscope. Photomicrographs of the stained sections were done by using a photomicroscope. Comparisons of structure and pathology of organs were made among treatments.

Results and discussion

Chemicals used in aquaculture

Mostly ten different categories of commercial aqua-drugs and chemicals were found to use by aqua farmers in their aquaculture activities. The categories include antibiotics, disinfectants, gas removal, oxygen supplier, vitamins and minerals, growth promoter, insect killer, algae killer, predator killer and pH balance (Table 1). About 11 antibiotics, 10 disinfectants, 9 gas removal agents, 5 oxygen enhancers, 4 vitamins, 3 growth promoters, 1 enzyme, 2 insect killers, 1 predator killer, 1 algae killer, 1 pH balancer, with different trade names were found to use by the aqua farmers for the treatment of fish diseases (Table 1). Twenty two pharmaceutical companies were seen to provide commercial aqua drugs and chemicals to fish farms. Major companies were Fish Tech, Renata, Firstcare, ACI, ACME, Square, Samco, Novartis, Eon, Opsonin, Al Madina, Rals, Organic, Padma, Nature care, Advance and SK+F (Table 1). During the survey, 21 drugs retailers have been visited and around 50 trades named aqua-drugs and chemicals were recorded.

Impact of aqua drugs on fish

Farmers in the study area cultured mostly Shing (*Heteropneustes fossilis*), Koi (*Anabas testudineus*), Tilapia (*Oreochromis nilotica*) and Pangus (*Pangasianodon hypophthalmus*) In the Fulpur, Sing was found to susceptible to disease with 90% prevalence as reported by the farmers followed by Edwardsiellosis in Pangas (80%), red and white spot on Koi (40-50%) and EUS (20%) and dropsy (10%) in Tilapia (Table 2). However, in Muktagacha, Koi was the most susceptible species to white spot disease with 50% prevalence followed by red spot on pangas (40%), EUS (30%) in Tilapia, Sharputi, Rui, Catla and Mrigal (Table 3). On the other hand, Sing was reported to be the most susceptible species to disease with 100% prevalence of swollen abdomen followed by edwardsiellosis in Pangas (40-50%) in the Fulbaria area (Table 4). Shing had 90-100% mortality within very short period from unknown reason with no obvious clinical sign but only swollen abdomen.

Farmers were asked about the use and impact of commercial aqua drugs in recovery of such disease. They reported that after using commercial drugs single or combination of many drugs, they got good recovery of fish diseases. In Fulpur, farmers used Renamycin, Ossi-C and Polgard plus and in Fulbaria, they used Poldard plus and Bactisol for the treatment of Shing (Table 2, 3 and 4). EUS affected tilapia was treated with Renamycin, Polgard plus and Ossi C with 80-95% recovery from disease in Fulpur and Muktagacha. Edwardsiellosis affected Pangus were treated with Renamycin, Timsen, Polgard plus and Ossi C in Fulpur and with Geolite and Timsen in Fulbaria having 80% recovery in both upazillas. Dropsy

was seen with Tilapia in Fulpur upazilla where farmers used Aquamycin and Ossi C as drugs with a result of 95% recovery (Table 2, 3 and 3). In Fulpur and Fulbaria, Zoothamnium and various spots on skin, scales drops in some parts of koi, where farmers used Renamycin, Aquamycine, Ossi-C and Polgard plus drugs as treatments and

achieved 70-80% recovery. Sharpunti, Rui, Catla and Mrigal were also affected by EUS in Muktagacha and the farmers achieved good result by applying drugs like Renamycin and Ossi C. It was thus observed that aqua drugs played excellent role in recovery of fish diseases and maintenance of health.

Table 1. Drug used by the farmers for production and management of fish in ponds.

Trade name	Active ingredient	Purpose of use	Company
Renamycin	Oxytetracycline	As antibiotic	Renata
Amoxifish	Amoxicillin trihydrate	As antibiotic	Fish tech
Timsen	n-alkyl dimethyl benzyl ammonium chloride-40%	As disinfectants	Eon
Aquamysine	Chlorotetracycline	As antibiotic	Fish tech
Ossi-C	Oxolinic acid, bitaglukan, vit-C	As vitamins	Fish tech
Aquamycine	Oxytetracycline hydrochloride	As antibiotic	ACI
Virex	Per oxy monosulfate, sodium hydrochloroisocyanora te	As disinfectant	ACI
Aqua kleen	Tetra decile trimethyl ammonium bromide, benzal conium chloride, amino nitrogen	As disinfectant	Square
Geolite gold	SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ , TiO ₂ , MgO, etc	For removing gas	Fish tech
Oxy Dox F	Oxytetracycline hydro-chloride, doxycycline	As antibiotic	ACI
Polgard plus	3-methyl 4 alkyl two chain brominated compound	As disinfectant	Fish tech
Charger gel	1-3 D glucan, polysaccharides, betain, bitaglucans	As growth promoter	Fish tech
Seaweed	Elemental copper, inert ingredient	As algae killer	Fish tech
Bactisal	Alkyl benzyle dimethyl ammonium chloride	As disinfectant	First care
Deletix	Deltamethrin	As argulus killer	Fish tech

Table 2. Impact of aqua drugs on fish health and disease recovery in the study area at Fulpur.

Species	Diseases Prevalence (%)	Clinical sign	Commercial aquadrugs used	Recovery	Affected months
Tilapia	EUS (20%)	Red spot on body surface, lesion on body surface	-Renamycin @ 50 mg/kg body weight-Polgard plus @ 500 ml/acre -Ossi-C @ 3 gm/kg feed	95%	August
Tilapia	Dropsy (10%)	Swelling of abdomen, accumulation of fluid in abdomen	-Aquamycine @ 1-2 gm/feed - Ossi-C @ 3 gm/kg feed	95%	August
Pangus	Edwardsiellosis (80%)	Exophthalmia, red spot on abdomen and dorsal side	-Renamycin @ 5g/kg feed -Timsen @ 1 st dose: 80 m/33dec, 2 nd dose: 50 gm/33 dec -Ossi-C @ 3 gm/kg feed -Polgard plus @ 5 ml/decimal	80%	November-December
Pangus	Edwardsiellosis (80%)	Exophthalmia, red spot on abdomen and dorsal side	-Renamycin @ 5g/kg feed -Timsen @ 1 st dose: 80 gm/33dec, 2 nd dose: 50 gm/33 dec -Ossi-C @ 3gm/kg feed -Polgard plus @ 5 ml/decimal	80%	November-December
Koi	(50%) red spot	Zoothamnium and red spot on abdomen, scaleless	-Renamycin @ 5g/kg feed -Ossi-C @ 3 gm/kg -Polgard plus @ 5 ml/decimal	70%	November-December
Koi	(30-40%) white spot	White spot on tail, gill	-Renamycin @ 5g/kg feed -Ossi-C @ 3 gm/kg feed -Polgard plus @ 5 ml/decimal	80%	March-April

Table 3. Impact of aqua drugs on fish health and disease recovery in the study area at Muktagacha.

Species	Diseases Prevalence (%)	Clinical sign	Commercial aquadrugs used	Recovery	Affected months
Shing, Magur	(10%) no symptom	No symptoms, sudden death, slightly red line on body surface	-Aquakleen @ 0.5-1 liter/acre -Gas check 200 gm/acre -Bleaching powder @ 700 gm/32 dec -Renamycin @ 5g/kg feed -Ossi-C @ 3 gm/kg feed -Polgard plus @ 5 ml/decimal -Virex @ 100-200 gm/33 dec -Aquamycine @ 1-2 gm/feed	95%	March-April
Tilapia, Sharpunti, Rui, Catla, Mrigal	EUS (30%)	Red spot on body surface, lesion on body surface	-Renamycin @ 50 mg/kg body weight -Ossi-C @ 3 gm/kg feed	80%	August
Pangus	(40%) red spot	red spot on operculum, spoilage on body surface	-Renamycin @ 5g/kg feed -Geolite gold @ 200-250 gm/decimal -Aqua kleen @ 0.5-1liter/acre	80%	November-December
Shing	(40%) Tail rot	Tail rot	-Polgard plus @ 5 ml/decimal -Aqua kleen @0.5-1-liter/acre -Geolite gold @ 200-250 gm/decimal	80%	November-December
Koi	(50%) white spot	White spot on tail, gill	-Aquamycine @ 1-2 gm/feed -Ossi-C @ 3 gm/kg feed -Polgard plus @ 5 ml/decimal	70%	November-December

Table 4. Impact of aqua drugs on fish health and disease recovery in the study area at Fulbaria.

Species	Diseases Prevalence (%)	Clinical sign	Commercial aquadrugs used	Recovery	Affected months
Shing	(100%) swollen abdomen	Swollen abdomen with occasional spots	-Polgard plus @ 5 ml/decimal -Bactisol @ 350 ml/acre for 3 ft depth	-	December-January
Pangus	(40%) red spot	Red sign on eye, fin and heat; Movement on surface	-Geolite @ 200-250 gm/decimal -Timsen @ 1 st dose: 80 gm/33 dec, 2 nd dose: 50 gm/33 dec	80%	
Pangus	Edwardsiellosis (50%)	Speedy movement before death, mouth remains in water surface, Exophthalmia, red spot on abdomen and dorsal side	-Renamycin @ 5g/kg feed -Ossi-C @ 3 gm/kg feed -Polgard plus @ 5 ml/decimal -Geolite gold @ 200-250 gm/decimal -Gasonex plus @ 200-400 gm/acre	70%	December-January

Laboratory study for health check

Clinically all the fishes of various regions did not show any remarkable changes. Histopathology in the control ponds, skin-muscle, liver, kidney and gill of fish had almost normal structure. However, in the

chemical treated ponds, the above mentioned investigated organs of fishes had remarkable pathological changes like necrosis, hemorrhage, vacuum, melanocytes and partial loss of organs (Figure 1)

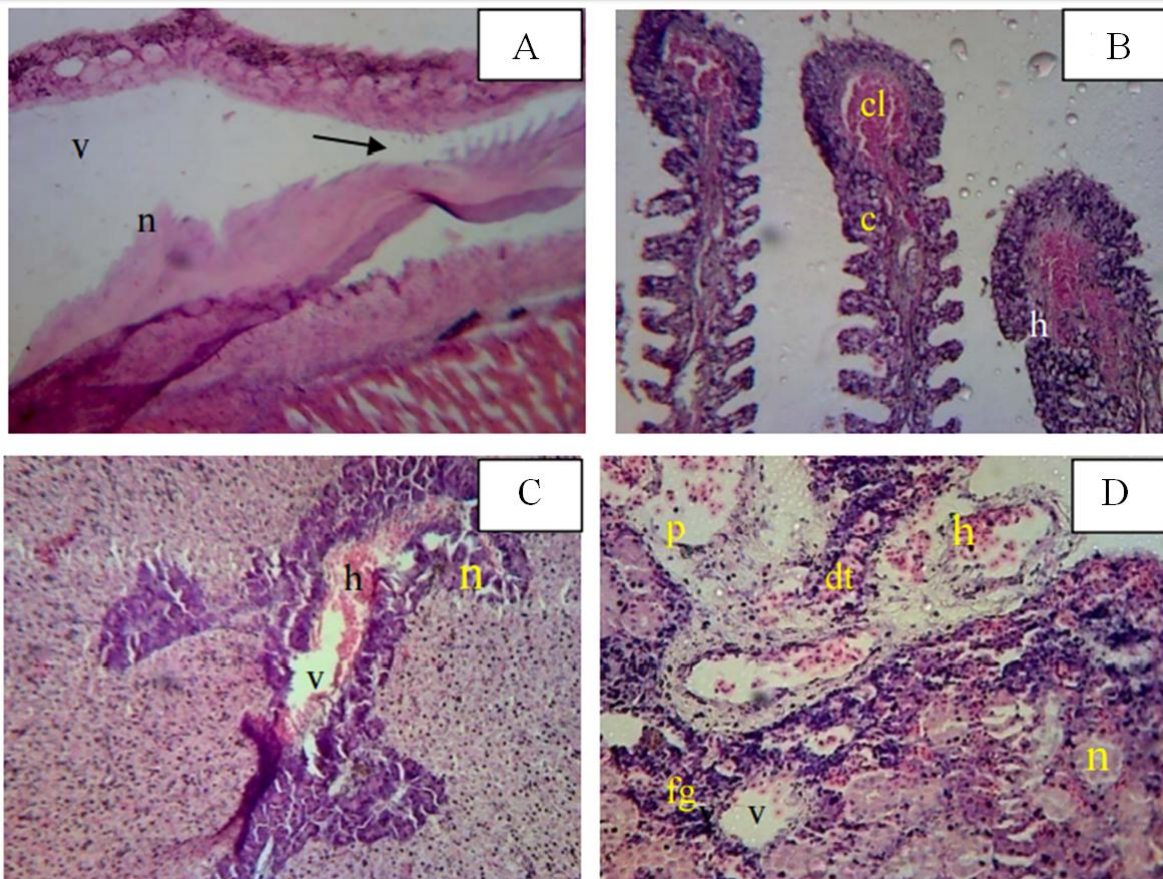


Figure 1. Histopathological section (H & E × 150) of different organs of pangus. A- skin-muscle showing vacuums (v), necrosis (n) and ruptured dermis (arrow). B- gill showing cyst (c), haemorrhages (h) and clubbing (cl). C- liver showing necrosis (n), haemorrhages (h) and vacuums (v). D- kidney showing fungal granuloma (fg), haemorrhages (h), pyknosis (p), vacuums (v), necrosis (n) and degenerating kidney tubules (dt).

At present 150 products of 40 animal health companies were seen to market at field level. Moreover, these pharmaceuticals companies found to have very attractive information leaflet to sell their products to the farmer. Farmers of the selected areas used mainly Amoxifish, Renamycin, Timsen ,Aquamysine, Deletix , Seaweed, Ossi-C ,Oxy gold, Charger gel, Renaquine, Polgard plus, Vectisol, Aqua kleen, Rotenone , Aqua, boost, Timsen, Sumithione, Doxioxy, Aqua boost and Virex as trade name for disease treatment. Faruk et al (2008) also found the similar drugs like JVzeolite, Geotox, Green zeolite, Orgavit aqua, Fish vitaplus, AQ grow-G, Oxy flow, Oxy max and O₂-marine. However, in the present study we got some new products with various trade names which include Ossi-C, Oxy gold, charger gel, Polgard plus and Vectisol.

In the study area different types of fish diseases like EUS, tail rot, fin rot, red spot, white spot and dropsy in different fish species mainly in Shing, Koi, Tilapia and Pangus were observed. A number of authors also reported the similar observation in aquaculture of Bangladesh (DoF, 2002 and Faruk et al., 2004). Most of the farmers of the selected areas used drugs and chemicals to control these types of disease. It meant that

disease problem was one of the major concerns in aquaculture of the studied areas.

The present study revealed that commercial aqua drugs have some positive impact on fish health management and disease treatment at farmer's level. It was observed that farmers of the selected areas got good results in disease treatments by applying single or combinations of various aqua-drugs and chemicals. In some cases after use of drugs they got maximum 95% recoveries within a short period of time that influenced farmer to use more commercial aqua-drugs in controlling the diseases. Sometimes they applied drugs higher than recommended doses to get quick recovery. Normally in rural aquaculture, farmer used traditional chemicals in health management such as lime, salt, potassium permanganate, sumithion , melathion, formalin and bleaching powder. But, they did not get better results than commercial drugs and chemicals. So, the farmer showed less interest to traditional drugs for disease control. The uncontrolled uses of drugs sometimes create negative impact on fish health. Pathogen might evolved drug resistance ability due to unconscious and repeated use of drugs. It was interesting that treatment of the diseases of Shing did not show any recovery. In a certain region of the study area Shing had 90-100% mortalities within very short

period from unknown reason with no obvious clinical sign.

In the present study, it was observed that about 11 antibiotics with different trade names were used by the farmer. It was found in the present study that antibiotics were used indiscriminately without knowing the exact reasons of disease. Some farmers did not follow the recommended dosages for treatment. In aquaculture improper use of drug or disinfectant can causes great loses of aquatic ecosystem. So, it is important to apply drug against appropriate disease and best application methods for aqua-health management.

Conclusion

The use of commercial aqua drugs and chemicals in aquaculture for various purposes is now widely recognized. The aquaculture activities in Bangladesh are also influenced by a number of chemicals. Farmers should have appropriate knowledge about the use of drugs and chemicals. They also should maintain proper withdrawal period for use of drugs chemicals. It is important that policy makers, researchers, and scientists work together to address the issues of use of new commercial aqua-drugs and chemicals with the view to reduce their adverse impacts. Efforts should be made towards finding non-

chemotherapeutic solutions to health management and disease control.

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