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## Aquaculture medicine and therapeutics in Alwar and Udaipur district of Rajasthan: A field study

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#### Abstract

Alwar and Udaipur are leading district for aquaculture activities in the state of Rajasthan. In May 2018, primary data on use of aqua drugs in fish farming were collected from 16 private fish farms in Alwar and 20 fish farms in Udaipur. Only 20% fish farmers in Alwar and 10% fish farmers in Udaipur were using medicines in fish ponds, mostly in the form of lime and  $KMnO_4$ . The other aqua drugs used by the farmers are salt, CIFAX, Bio-F (Probiotics) APC-carpmin forte (mineral nutrient forfeited with probiotics) ultra violet (Antifungal Antibacterial) APC aqua mix (mineral vitamin mixture) malachite green genoxy (DO improver), Aqua Flavin (for bacterial infection) minamil (vitamin mineral mixture), Optimum Oxygen Bio-Klean (soil probiotics) APC- Planktomin, use of these drugs is very limited (16%). In Alwar district salt was mostly used for treating bacterial infection in fish while lime was used for pond preparation. A thorough discussion was held with fisheries officials regarding the use of aqua drugs in these districts, however, it was found that no other drugs such as antibiotics and chemicals were used in aquaculture. The main constraint for adopting therapeutics is lack of availability and high cost of drugs. 82% farmers were not aware about the accurate dose of the drugs and were using without sufficient knowledge. 4% farmers also used neem cake for nursery pond preparation. 16% farmers used turmeric powder, mustard leaves powder and salts as antibiotics and growth promoters. The field study revealed that the use of medicine and therapeutics in fish farming is not a common practice. However fish farmers were very familiar for lime and  $kmno_4$ . Cost effective, efficient and organic herbal drugs are required for adoption and acceptance of medicines in aquaculture.

**Keywords:** aqua drug, neem cake, therapeutics, cost effective organic drugs

#### Introduction

Rajasthan is the largest state in India, where aquaculture is not a main farming activity, due to lack of perennial water source and lack of awareness about advantage of fish farming among farmers. However, in the recent years people are showing interest in fish farming and government also taking good initiative to enhance fisheries activity through trainings by Krishi Vigyan Kendra (KVK), State Agricultural Universities and fisheries departments. The Indian government is also providing good subsidy to the fish farmers under blue revolution hence, fisheries is now becoming a part of an integrated farming system in Rajasthan. People integrate the aqua farm with their agri farm and now they are reaping a good benefits through this fish farming which is also motivating others in to the system. In aquaculture disease is a major constrain in the form of bacterial disease, viral disease, fungal disease, protozoan disease etc. The main reason of these diseases is irresponsible fisheries, poor farm management, lack of awareness about the diseases and therapeutics measures. The present study hence conducted to assess the present status of therapeutics measures, medicine use and awareness of the farmers in good management practices. Alwar and Udaipur districts being the leading districts for aquaculture activities in Rajasthan, were selected for the study.

#### Materials and Methodology

For this study Alwar and Udaipur fish farms were visited during May 2018. The samples of farm diseased fish were collected and oral interview was taken individually from person to person. These diseases of fishes were classified in viral, fungal, bacterial and protozoan diseases and four tables were formed to data entry of the related diseases (viral, fungal, bacterial and protozoan). The same procedure was followed for Udaipur district. The questions were fixed for each farmer or entrepreneur regarding the therapeutic measures were taken

during the fish disease remediation.

The questions were very simple and friendly, these were-

1. What is the area of farm?
2. What kind of fishes are being cultured?
3. What is the stocking density?
4. What kind prevention measures are adopted?
5. What kind of medicines are used during disease?
6. What strategy are used to diagnose the disease?
7. What about the regular monitoring of water quality parameters?
8. What amount is invested on medicines?
9. What management measures are taken in case of fast spreading diseases?
10. What is their interest in therapeutic measures?

Finally a meeting was done with their village chief (Sarpanch) and suggestions were provided in the form of a pamphlets to create awareness among the farmers with regarding to therapeutic measures.

**Results**

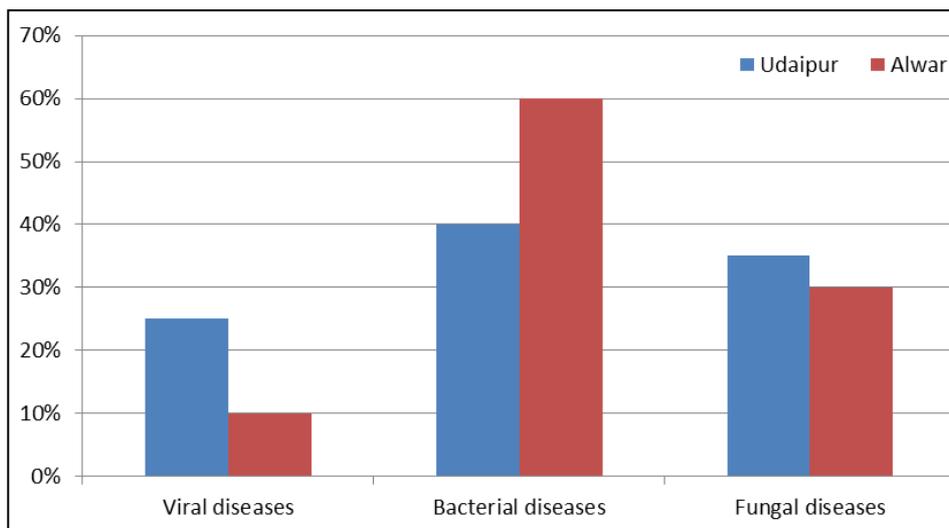
During the period of 30 days, from 1 to 30 May, 2018 primary

data on use of aqua drugs in fish farming were collected from 16 private fish farms in Alwar and 20 fish farms in Udaipur. Only 20% fish farmers in Alwar and 10% fish farmers in Udaipur were using medicines in fish ponds, mostly in the form of lime and KMnO<sub>4</sub> (Table 1). The other aqua drugs used by the farmers are salt, CIFAX, bio-F (Pro-Biotics) APC-Carpmin forte (mineral nutrient forfeited with Pro-Biotics) ultra violet (Antifungal Antibacterial) APC aqua mix (mineral vitamin mixture) malachite green genoxy (DO improver), Aqua Flavin (for bacterial infection) minamil (vitamin mineral mixture). Optimum Oxygen Bio Klean (soil probiotics) APC- Planktomin, use of these drugs is very limited (16%).

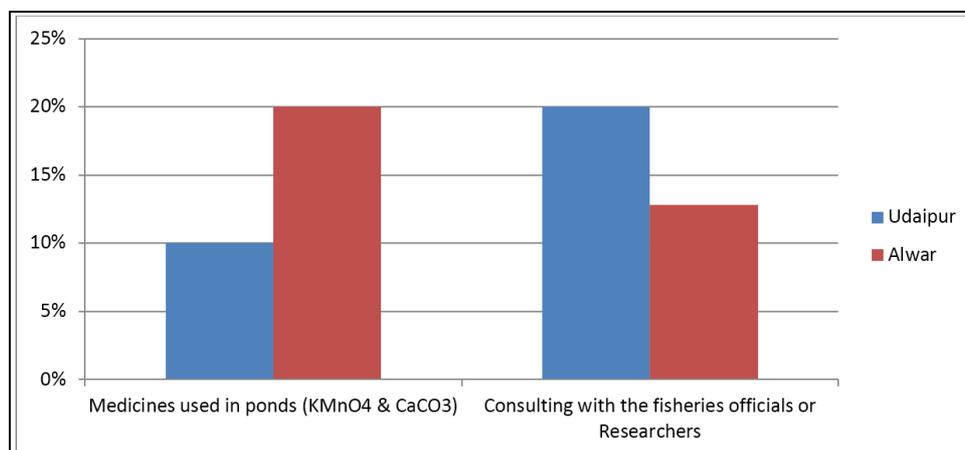
Incidents of viral and fungal diseases were more in Udaipur district while bacterial diseases were higher in the fish farms of Alwar (Figure-1). In both districts 82% farmers were not aware about the accurate dose of drugs and are using without knowledge. 4% farmers used neem cake for nursery pond preparation. 16% farmers used turmeric powder, mustard leaves powder and salts as antibiotics and growth promoter.

**Table 1:** Percentage of disease types, therapeutics and willingness to approach fisheries officials for advisory services, in farms of Udaipur and Alwar district, Rajasthan, India

Parameters	Viral diseases	Bacterial diseases	Fungal diseases	Medicines used in ponds (KMnO <sub>4</sub> & CaCO <sub>3</sub> )	Consulting with the fisheries officials or Researchers	Proper feeding and management
Udaipur	25%	40%	35%	10%	20%	Nil
Alwar	10%	60%	30%	20%	12.8%	Nil



**Fig 1:** Incidence of bacterial, viral and fungal diseases in Udaipur and Alwar district farms



**Fig 2:** Medicine use and farmers awareness among farmers in Udaipur and Alwar district

## Discussion

As result shows that in both districts 82% farmers lack awareness about drugs and their application, which could one of the main reasons for the reduction in production, spread of disease and the water quality deterioration. The results are comparable with the study conducted by Nancy De Briyne 2018 [2], on Fish Diseases Lacking Treatment: Gap Analysis Outcome. In the study it was concluded that to prevent bacterial diseases occurring (and the need to treat with antibiotics) it is necessary to be able to effectively treat parasitic infections because the parasite infections are a main cause of concern in all the fish species examined. Treatment to common parasites often lacks efficacy or is not available to infect the fishes. The proper treatment protects the production from fungal infection because the Secondary bacterial infection can occur between parasitic and bacterial diseases.

Salt was mostly used by the farmers of Alwar district for treating bacterial infection in fish while lime was used for pond preparation. The present study showed that the 4% farmers used neem cake also for nursery pond preparation. In both districts the farmers used turmeric powder, mustard leaves powder and salt as antibiotics as well as growth promoters. This was a positive sign towards promotion of locally available resources to treat the farmed fishes. However, there is need for a proper research on antibiotic property of such locally available resources to properly define the exact quantity and quality for the application. A study by Jorge *et al.*, 2014 [1], on antimicrobial peptides from fish concluded that the continuous work on such aspects is needed to better understand both the role of peptides in host defence of the fish, as well as the development of these peptides and their derivatives as potential therapeutics. The constant risk of large-scale microbial infection that can lead to significant economic losses demands new strategies to prevent or treat the pathogens.

A thorough discussion with fisheries officials regarding use of aqua drugs in these districts and revealed that the other aqua drugs used by the farmers were salt, CIFAX, bio-F (Pro-Biotics) APC-Carpmin forte (mineral nutrient forfeited with Pro-Biotics) ultra violet (Antifungal Antibacterial) APC aqua mix (mineral vitamin mixture) malakite green genoxy (DO improver), Aqua Flavin (for bacterial infection) minamil (vitamin mineral mixture), Optimum Oxygen Bio Klean (soil probiotics) APC- Planktomin, the use of these drugs was very limited (16%). It could be concluded that the farmers were not using drugs or therapeutics primarily because the availability of drugs was limited in these areas and the drugs or therapeutics were also costly. Harvest of the fishes was also one method of diseases control. The study by Novotny *et al.*, (2004) [5] on Fish: a potential source of bacterial pathogens for human beings concluded that most outbreaks of food poisoning associated with fish derived from the consumption of raw or insufficiently heat treated fish, which may be contaminated with bacteria from water environment (*Vibrio* spp., *C. botulinum*) or terrestrial sources (*C. perfringens*, *Salmonella* spp., *Shigella* spp., *Staphylococcus* spp., *V. cholerae*), or fish products recontaminated after heat processing, Thus the required safety can be obtained only by using very fresh fish handled under hygienic conditions.

For maintaining the quality of harvested fish it is needed to preserve it at a lower temperature so the quality of the product will remain fresh but Hatha and Perumalsamy, 1997 [4] studied on Prevalence of Salmonella in fish and crustaceans from markets in Coimbatore, South India and concluded that

the lower temperature favoured many pathogen while higher temperature resulted in the reduction in salmonella. Hence, proper cooking was necessary to control food poisoning. In another study in USA by Lipp EK, Rose JB (1997) [6] on the role of seafood in food-borne diseases concluded that the occurrence of microbial pathogens and natural toxins in fish and shellfish harvested in one geographical area can have an impact on many geographically distinct populations as a result of widespread distribution and transport of seafood's, and the problem will not be rectified without the implementation of increased sanitation practices.

The present study showed lack of management practices (Table-1) to be responsible for the low production and disease sensitive fish farm. Rajasthan has a great diversity in relation of availability of water resources hence, government societies, research organisations, education institutions and individual farmers need to put a combined effort to conserve the resources as well efficiently manage them towards increased production in the form of aquaculture yield to farmers.

## Conclusion

Field study reveals: that the use of medicine and therapeutics in fish farming is not an essential practice. However fish farmers are very familiar for lime and KMnO<sub>4</sub>. Cost effective, efficient and organic herbal drug are required for adoption and acceptance of medicines in aquaculture. It is also concluded that the proper use of water resources with proper sanitation practices may keep the fish farm free from the diseases and promote fish culture as a great opportunity for employment as well as income generation.

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