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Review Article

A Review on Scope of Homeopathy in Aquaculture for a Nourishing Future

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Abstract | Recent trends in disease management and prevention intensifies the chances of naturally occurring resistant pathogens. Innovations for a better sustainability of aquaculture enhances a broad area for research on the ancient natural techniques and methodologies. Agriculture has been one of the most important part in ancient eras as well as in present days providing the basic requirements for survival. Homeopathy becomes the largest part in this course of disease treatment, by providing the adequate support in any kind of disease management and prevention. Medical science has almost improved with the latest and advanced technology for the prevention and management of any kind of major disease outbreaks, while homeopathy creates the scope for fulfilling the future needs by providing better production without any harmful effects.

Keywords | Aquaculture, Agriculture, Homeopathy, Homeopathic complex

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INTRODUCTION

Aquaculture, the most emerging profitable business as part of huge revenue generation in the world, generating many scientific approaches towards the daily challenges occurring in the course of business. Modern techniques have been developed in the course of time for utmost mass production of aquatic organisms without any harmful and noticeable loss. Some of the major constrains plays an important part in the overall process including disease management, feed management, resource management and capital management.Ancient aquaculture practices reveal the basic of cultivation techniques simultaneously it creates the mysterious place for producing highly valuable product with lesser harmful effect.

Homeopathy, a safe, gentle and natural health care system treating each animal as a unique individual with the aim of stimulating their own healing ability and works with individual body to relieve symptoms, restore itself and improve their overall health (www.homeopathycenter.org). It is the second largest therapeutic system use in the world (World Health Organisation) and is extremely safe to use, even with very small children and pets with no side effects as of many traditional medications (Benites NR, 2002).

Homeopathic medications are affordable and most of them are made from a wide range of natural or synthetic sources including minerals and chemicals, plant materials including roots, stems, leaves, flowers, bark, pollen, lichen, moss, ferns and algae, microorganisms including fungi, bacteria, viruses and plant parasites including animal organs, tissues, secretions and cell lines; human materials include tissues, secretions, hormones, and cell lines (www.homeopathy-center.org). Homeopathic medications have been proving its efficacy from the ancient era having more effective than allopathy, absence of side- effects and drug residues and considerably economical with cheaper cost (Tony Pinkus, 2009). Many emerging diseases in the course of treatment has impelling the veterinarians to adopt the technique.

Antimicrobial drugs have been widely used in aquaculture for the treatment of infectious bacterial diseases for more

than decades but simultaneously it is become unpopular amongst the farmer due the development of resistant pathogen (Doehring and Sundrum, 2016). Extensive use of antibiotics causes the development of many resistant strains of bacteria in worldwide resulting in the loss of production, which urges many farmers to adopt the homeopathic treatments (Laxminaryana et al., 2013; Doehring and Sundrum, 2016).

The term homeopathy was coined by Samuel Hahnemann, a German doctor and chemist (1796). The word was derived from the Greek words 'similar suffering'(homoios means similar and pathos means suffering or sickness) referring to the 'like cures like' principle of healing (www.homeopathycenter.org).

Laws or Principles of Homeopathy

Homeopathy can be the most mysterious way of disease management while it works with some of the basic principles or laws. These laws or principles have occurred regularly throughout the development of medicines.

The first law or principle of homeopathy is known as the *simillimum* or 'like cures like'. The first law states that, a remedy can cure a disease, if it produces in healthy person symptoms to those of the disease.(http://www.janethull.com/newsletter/0905/the-four-fundamental-laws-of-homeopathy.php)

The second law of homeopathy refers to a single remedy of a particular problems and that is one remedy one solution. Multiple remedy does not work unlike other medicinal practices. (http://www.janethull.com/newsletter/0905/the-four-fundamental-laws-of-homeopathy.php)

The third law or principle of homeopathy is the law of potentiation or the minimum dose, where the minimum doses required to start the healing process. (http://www.janethull.com/newsletter/0905/the-four-fundamental-laws-of-homeopathy.php).

The fourth principle or law of homeopathy explains about the direction of cure, where the healing process takes place from the major to minor affect places.(http://www.janethull.com/newsletter/0905/the-four-fundamental-laws-of-homeopathy.php).

Homeopathy Impression on Fish Morphology

Aquaculture can be considered as one of the most diversified area comprising the farming of freshwater and saltwater organisms such as finfish, mollusks, crustaceans and aquatic plants under controlled conditions and can be differentiate into commercial and traditional farming practices (Chinarong A and Krishna Y, 2013). Fishes are cold blooded, aquatic, gill breathing and oviparous having a boat shaped body, divided into three regions namely-Head,Trunk and Tail and the body is covered by an exoskeleton of overlapping mesodermal scales, uses gills for respiration while some use lungs for breathing. Fish is highly nutritious containing large amount of proteins, fats, vitamins and minerals. The increasing demand of these highly nutritious food imposes the challenge for a better management and cultivation method. Disease management and prevention becomes the primary notable step for intensifying the production as well as revenue generation. Modern antibiotic and chemical therapy becomes the major drawback in the course of production along with the other management like feed and environmental management (Doehring and Sundrum, 2016). Many of the antibiotics and chemicals application amplify the complications like water and soil pollution with the production of unhealthy aquaculture product (Doehring and Sundrum, 2016). Homeopathy, can be the key for providing a healthy and profitable production with mutual benefits.

Homoeopathy works with any living organisms and hence fish can be successfully treated by it. Remedies can even be used preventatively for certain fish diseases, rather than trying to drop a pill down the mouth of a wriggling fish. Although there is an easier way – just medicate the water in which it swims. The doses should be decided according water area along with stocking density of fish. For instance,a small tank containing water and diseased fish can be treated with adding one pill per liter into the water and followed by waiting for the time of respond in the next 24 hours. For larger area and fish numbers, the infected fishes can be treated partly in group wise. Long exposure of the fishes to the medicated water under sunlight may also cause an aggravation from over treatment. Proper identification of symptoms is required for proper homeopathic treatment (Doehring and Sundrum, 2016).

Efficacy of Homeopathy in Fish

Homeopathy medicines may be proven as perfect solution for any kind of diseases, having many beneficial effect however there is less research works conducted in the area. The effect of many homeopathic complexes in fish are still understudy.

A comparative study was conducted in an experiment done by Valentim et al. (2008),where the effect of homeopathic complex was evaluated against the performance, the gonadal response, gills and liver histology of the Nile tilapias, during the phase of gonadal differentiation.In recent aquaculture practices, Nile tilapia (*Oreochromis niloticus* L.) found to be one of the most profitable fish species in fish farming. One of the major constrains arises in the course of production of tilapia is, the overpopulation of male compared to female, which is the result of precious sexual maturity with periodic asynchronic spawning (Ribei-

ro et al., 2001). Cultivation of single gender can be found more beneficial than both generation as male shows more growth than female (Valentim-Zabott et al., 2008). One of the most prominent method for the creation of single gender population can be demonstrated by administration of synthetic sexual steroid hormones in feed (Valentim-Zabott et al., 2008).

The experiment was aimed to control the alteration in the sexual proportion, by addition of homeopathic complex *Homeopatila RS* (REAL Homeopathy, Brazil) and 17**α**-methyltestosteron (positive control), containing the iodine, carp hypophysis extract and extract from tilapia tests, along with the 30 % alcohol as negative control (Valentim-Zabott et al., 2008). All the mixtures have been added to the fish feed. The total experiment was conducted under the average room temperature of 30.53± 4.16 ^{O}C and water temperature of 26.77 ± 2.81 ^{O} C. All the larvae were 100 % parasitized with ciliate ectoparasite *Trichodina* spp. (80% occurrence) and monogetic *Gyrodactilus* spp. + *Trichodina* spp. (mixed infection complying 20 % occurrence).

The analyses did not show any symptoms of presence of parasitic infection at the end of experiment. The performance of fish morphology can be noted as there was higher weight and length in case of the fish treated with *Homeopatila RS* compared to other treatment. The liver somatic index of the *Homeopatila RS* group showed significant lower than the other groups treated. The histological analysis showed a significantly lower lipid inclusion in the liver, in case of *Homeopatila RS*, group compared to other groups. There was no significant difference observed in case of sexual proportion, while both groups show significantly lesser number of male gonads than to hormonally treated group (Valentim-Zabott et al., 2008).

A significant difference was observed in terms of average final total length, final pattern length and final weight after treating the homeopathic complex. The survival rate of the fish group treated with *Homeopatila RS* was higher than the other two. However, the reduction of growth rates, weight and survival may reduce due the high stocking density. The male (52.5%) and female gonads (61.5 %- 64.3 %) percentage was significantly lower as observed in case of other researcher (Hein, 2003; Mainardes- pinto CSR et al., 2000).

The experimental results did not cause alteration in the sexual proportion by addition of the homeopathic complex *Homeopatila RS* to fish feed; however, it was associated with positive effects on the survival of larvae and lower average value for hepatic lipid inclusion compared to the other groups (Valentim-Zabott et al., 2008).

A similar kind of experiment was conducted by Junior et al. (2012) explaining about the morphological changes, survival rate and muscle fibre hypertrophy occurring due to the application of homeopathic complex along with synthetic hormone. The experiment was conducted under controlled environmental condition, where the statistical differences were observed between the treatments for the variables, average final weight, TL, SL, trunk length, body height and width. The result showed a noticeable increase in case of the fingerlings of nile tilapia treated with Homeopathic complex *Homeopatila RS,* had greater hypertrophy of muscle fibers, smaller average body size and higher survival, as compared to the animals treated with synthetic hormone (17-α-methyltestosterone) and control (Table 1).

Table 1: Survival rate of nile tilpia under different source of treatment.

Source	Control	Synthetic Hormone (17-α-methyltestosterone)	Homeopathy
Survival rate	54.1 %	50.3 %	87.8 %

Table 2: Details showing the different range of treatment

Treatments	Details
Control	commercial diet
W + HP	commercial diet and homeopathic complex dissolved in the transport water
D + SU	commercial diet supplemented with sucrose
D + HP	commercial diet supplemented with homeopathic complex

Explaining the responses to these homeopathy complexes become major conflict of interest in the different species. An experiment was conducted by Aberu et al. (2013) revealing the physiological responses of pacu (*Piaractusmeso potamicus)* while treated with homeopathic product. Pacu is a well-known Brazilian fish with high market value but the major loss occurs due to the various stress factors occurring during the direct and indirect transport. The experiment was carried out taking the juvenile pacu in controlled environmental and physical conditions. A commercial homeopathic complex was used consisting of Cocculus 12CH, petroleum 12CH, Tabacum 12CH, Bixa Orellana 12 CH. The experiment was carried out in such a way, where species were exposed to a wide range of treatments. (Table 2) All the juvenile pacu were subjected to the treatment for 10 consecutive days and then transferred in polythene bags with proper care to identify the stress indicators. The physiological indicators of the stress like blood glucose, cortisol and chloride levels, hematocrit, haemoglobin and total protein and mortality were determined. A significant increase in hemartocrit and haemoglobin and low plasma chloride levels were observed after transport in all treat-

ments. Homeopathic complex did not show any effective result in case of stress tolerance. A similar result was described by Melo et al. (2009), who observed decrease in the total plasma protein concentration in female nile tilapia (*O. niloticus*) after hypoxia. In matrinxa (*B. amazonicus*), Abreu and Urbinati, (2008) did not report significant differences for plasma protein after submitting the fish to stress by capture and air exposure.Hence, the mode of action may be differing in case of these kind of species.

Homeopathic Derivatives from Fishes

For more than hundred years' homeopathy has been proving its efficacy through its immense beneficial uses. In spite of this, aquaculture contributes its mark in the course of preparation of homeopathic medicines. Some of the common medicines derived from fishes are Erythrinus, Gadus-morhua, Oleum jacorisaselli, Eel serum, Ichthyolum and Trachinus (Joseph, 2012).

DISCUSSION

Disease management has become one of the major threats in medical sciences as improper diagnostic treatment may lead to either the death of the animal or may lead to the development of a resistant organism. Many of the chemicals and antibiotics used for the treatment purpose causes the side effects for shorter and longer periods. Sometimes the treatment may lead to a complete genetic modification of the organisms. Homeopathy performs as the revolutionary product having any notable side effects and the products are ecological friendly. A very small amount of raw material can cure a major complication exploiting the environmental preservation. Homeopathy does not produce any toxic residues in the course of treatment and the lower cost for the treatment draws most of the attention of farmer (Servais, 2003). As it is mainly derived from natural sources and the doses are also comparatively lower than allopathy, therefore it does not contaminate the healthy food chain or waterways or soil (Rosenbaum, 2002).

Many of the compounds found easily in our environment can be an important homeopathic medicine. *Natrum muriaticum* is an excellent example of the compound which easily available in local medicine stores. *Natrum muriaticum*is obtained from rocky shore minerals, which is chemically similar to sodium chloride (Premdass et al., 2014). Although there is no experimental information recorded regarding the role of *Natrum muriaticum* in ovulation of teleosts, yet it is a highly effective stimulus for ovulation in Black molly and Rosy barb, thus bring down the latency period to 23 ± 0.707 and 25.4 ± 1.817hr respectively (Vishakan et al., 2005). Vishakan et al. (2005) successfully spawned the black molly and gold fish using *Natrum muriaticum*.

According to Visakan et al. (2005) *Natrum muriaticum* can be used to induce breeding in fish. *Natrum muriaticum* increases the metabolic activities in fishes, which results in the weight gain and rate of excretion of ammonia increases. Likewise, it also influences the spawning process (fecundity). Therefore, the use of *N. muriaticum* as spawning agent can be prescribed because of its cost effective andbeneficial results without any side effects (Premdass et al., 2014). Vishakan et al. (2005) reported a similar kind of result by injecting 1000 centesimal potency of *Natrum muriaticum* into the goldfish (1ml/kg) resulting the induced spawning within 22 Hours against 5 days in the control.

Arsenicum album was unrevealed as a major homeopathic medicine against arsenic poisoning. Arsenic is a kind of metalloid. It has the capability to have a strong interaction with thiol groups, thiol residues in proteins, so that it affects the structure of the molecules present in the gills (Webb, 1996). Cakmak et al. (2006) studied Arsenicum album is an alternative medicine on arsenic and arsenic toxicity. Vijay et al. (2017) found radical change in the protein and lipid content of the gill after the treatment of arsenic album.

The use of homeopathic products in Nile tilapias diet (40 ml/kg of feed) benefited in the survival, muscle fiber hypertrophy, reduced the hepatic lipid inclusion, hepatosomatic index and total lipids content in the muscle tissue of fish (Valentim-Zabott et al., 2008; Júnior et al., 2012; Andretto et al., 2014; Mariana Manfroi Fuzinatto et al., 2015; Braccini et al., 2013). According to Lima et al. (2015) the development and evaluation of feed products (nuggets) based on fish treated with homeopathic medicines.

Siena et al. (2010) treated Nile tilapia (*O. niloticus*) with feed containing 40 ml level of the homeopathic product Homeopatila 100® in hydroalcoholic solution per kilo of feed presented higher survival rate and lower hepatosomatic index. It is also able to improve weight gain without compromising the physical, chemical, technological and sensory quality of the fish flour and cookie (Mariana Manfroi Fuzinatto et al., 2015).

The homeopathic complex (Homeopatila RS) prepared by REAL Homeopatia (Brazil) laboratory consists of solutions of Iodum 12C (10^{-24}); carp hypophysis extract 12C (10^{-24}) and extract from tilapia testes 30C (10^{-60}) Valentim-Zabott et al. (2008). Benez SM et al. (2004) found that an action on the metabolism of the thyroid and its hormones is attributed to Iodum.

Iodum in fish is present in form of follicles associated to the ventral aorta and plays an important role influencing the growing of bones, cartilages and muscles, and carbohydrate metabolism, proteins and lipids, activating the sexual

cycle events and the maturation of gonads (Lima et al., 2001).

Guedes et al. (2004) observed that the metamorphosis rates of fish treated with Homeopatila RS were significantly inhibited and showed a significantly lower liver somatic index. Differences in hepatic metabolism, in animals treated with homeopathy, can be considered as factors that could alter the liver proportion in relation to the corporal weight. Alteration in the frog metamorphosis rates was observed with homeopathically prepared thyroxine (Endler et al., 2003; Welles et al., 2007; Weber et al., 2008).

For more than 150 years, homeopathic medicines are proving its efficiency through the different mode of treatment. Homeopathy medicines do not have any side effects, given in minimum doses, stimulate the body's vital response and they have their own mechanisms of healing process. Disease management becomes the important part in the course of treatment and should be without any harmful effect towards the animal. Many of the medical treatments process do cure the disease but it setback with a mark of the disease while homeopathy cures with a beneficial way. The scope of homeopathy in near future can be expected with increasing in the antibiotic/ chemical resistant microorganisms, mutated disease/ syndromes and many other diseases.

CONCLUSION

A homeopathic remedy doesn't cure as such- it acts as a catalyst for healing. The correct homeopathic treatment not only alleviates symptoms of disease, but also brings about a sense of well-being. Homeopathy is an inexpensive healing modality that can complement to other therapies, including conventional medicine. It is an alternative discipline that resides at the edge of modern scientific approaches. Further studies can be considered in keeping the efficacy of homeopathy in aquaculture as well as agriculture for better sustainability.

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CONFLICT OF INTEREST

There is no conflict of interest involved in this manuscript.

AUTHORS CONTRIBUTION

All the authors are equally contributed in this review work.

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