FisheriesSciences.com©
4 (17) 2023 : 001-003 • Mini Review

Fishery workers; propensity score-matched; cox proportional hazard model; cardiometabolic diseases; chronic viral hepatitis

Dr. Faiz Alam*
Department of Fisheries, Faculty of Aquaculture, University of Akaliya, India

AUTHORS' CONTRIBUTION: (A) Study Design · **(B)** Data Collection . **(C)** Statistical Analysis · **(D)** Data Interpretation · **(E)** Manuscript Preparation · **(F)** Literature Search · **(G)** No Fund Collection

SUMMARY

Nucleic acid, including DNA and RNA, released by organisms can be used to detect their presence in the environment. In a variety of fields, DNA/RNA methods are utilized to identify organisms from ice, water, air, and soil. The headway in innovation prompted simpler location of various organic entities without affecting the climate or the actual creature. These techniques are being used in a variety of fields, including conservation, history, and surveillance. DNA and RNA strategies are widely utilized in hydroponics and fisheries settings to grasp the presence of various fish species and microorganisms in water. In any case, there are a few difficulties related with the unwavering quality of results due to the corruption of nucleic corrosive by a few elements. These techniques have been used to find a number of parasites and diseases in aquaculture. We discuss the fate of these nucleic acids when subjected to various water quality and environmental parameters, as well as the various aquaculture diseases and parasites that were detected using the DNA/RNA approach, in this review. The purpose of this review is to assist the researcher in understanding the potential of DNA/RNA-based pathogen detection in aquaculture; using this, a potential outbreak can be anticipated before it occurs. In addition, the purpose of this paper is to assist readers in comprehending a number of factors that degrade and may impede the detection of these nucleic acids.

Keywords: eDNA; eRNA; Fish disease; Surveillance; Hydrolysis; Degradation; qPCR

Address for correspondence:

Dr. Faiz Alam,
Department of Fisheries, Faculty of Aquaculture, University of Akaliya, India
E-mail: alamfaij77@edu.co

Word count: 1504 **Tables:** 00 **Figures:** 00 **References:** 10

Received: 03.04.2023, Manuscript No. ipfs-23-13584, **Editor assigned:** 05.04.2023, PreQC No. P-13584, **Reviewed:** 19.04.2023, QC No. Q-13584, **Revised:** 21.04.2023, Manuscript No. R-13584, **Published:** 28.04.2023

INTRODUCTION

Environmental DNA (DNA) analysis is a novel scientific method for identifying species from materials containing all living organisms' cellular and extracellular DNA. Pietramellara et al. point out that Pietramellara et al. refer to DNA as extracellular DNA 2009 [1]. Notwithstanding, analysts are utilizing various wordings, like DNA (extracellular DNA) or cfDNA (sans cell DNA). In 1986, the concept of extracting DNA from an environmental sample was demonstrated for the first time, and it was dubbed environmental DNA (DNA). The method has been demonstrated in a wide variety of ancient and contemporary terrestrial and aquatic habitats, and the identification of various DNA from macroorganisms validated its significance for conservation. Conservation biology, biodiversity study, and invasion ecology are increasingly utilizing environmental DNA (DNA) methods [2]. The least conspicuous advantage of DNA sampling is that it does not necessitate isolating the target organism in order to obtain samples. Environmental DNA methods can also be used to find parasites and diseases in water. Aeromonas and Flavobacterium are two of the bacterial species that have been found in aquatic environments, and there is a lot of evidence to support [3].

The researcher can thus isolate DNA from various water sources without affecting the aquatic environment. Not only is DNA being extracted from water samples, but it is also being extracted from soil, snow, and air, among other substrates. Historians have been able to discover new species and endangered species as a result of their extensive research into DNA. Natural nucleic corrosive, including RNA for the new infective SARS-CoV-2, has been effectively detached from emergency clinic air inspecting. The advances in symptomatic methods and instruments are the main motivations behind the progress of natural nucleic corrosive location. Utilizing DNA-based methods for direct detection in water eliminates the need to acquire and investigate diseased hosts, resulting in significant cost and effort savings for disease monitoring [4]. Using DNA analysis, eukaryotic micro- and macrobial communities and populations have been successfully detected and monitored. Extracellular nucleic acids can now be easily identified and quantified in a variety of media thanks to advancements in DNA analysis. There are a variety of approaches taken, including DNA metabarcoding, sequencing, quantitative polymerase chain reaction (qPCR), and digital droplet PCR (ddPCR). The purpose of this study is to discuss the fate of extracellular nucleic acids exposed to environmental conditions in water and the application of DNA/RNA

to disease surveillance. Different free examinations are being led all around the world to evaluate the utilization of the DNA approach for the reconnaissance of illness, and our review expect to unite everything to assist with fishing wellbeing scientists, hydroponics ranchers, and policymakers [5].

DNA in fish disease

Bacteria

It has been demonstrated that cultures of bacteria, archaea, and fungi can release their genetic material into the extracellular medium, as well as into multicellular microbial communities like biofilms. Microbes discharge their DNA in water by various strategies, including cell lysis and expulsion [6]. Because the exonucleases are unable to rapidly degrade the DNA, the DNA released by cell lysis typically has a higher integrity. Some bacteria, like Deinococcus radiodurans, use extrusion, in which damaged DNA is released and new DNA is made, to survive. While growing in the media, numerous environmental bacteria, such as Micrococcus, Acinetobacter, Bacillus, Flavobacterium, Azotobacter, Pseudomonas, and Alcaligenes, release their genetic material. Temperature, salinity, turbidity, and vegetation all influence the amount of DNA found. The amount of DNA in freshwater systems ranges from 1.74 to 7.77 g/L. Many fish bacterial diseases affect freshwater aquaculture, costing farmers a lot of money. They might be able to predict the amount of bacteria in their farms with the help of DNA methods. A number of studies are being conducted to discover an effective method for directly detecting these pathogens from water samples. The gram-negative bacterium Flavobacterium columnare, which infects a variety of fish species, is typically isolated to the skin, gills, and water samples before spreading throughout the body [7]. The only reliable means of disease control are precise and prompt diagnosis of F. columnare and the implementation of practical preventative measures. F. psychrophilum was found in various stream water tests in Japan. They tracked down a higher presence of F. psychrophilum during late-spring and fall, and the presence of this microscopic organism relies upon the water temperature. In addition, salmon recirculatory aquaculture systems (RAS) contained. In a similar vein, the coastal regions of Bangladeshi river basins were found to contain seven distinct species of Aeromonas. Using the eDNA method, they also discovered that the number of bacteria changes with temperature over the two-year study period. There are still a lot of bacterial pathogens that cause losses that haven't been studied [8].

DISCUSSION

DNA and RNA have enormous potential for disease risk monitoring because they can help us learn more about the number, diversity, and presence of pathogens. Similar to methods for detecting free-living pathogens, traditional pathogen detection methods frequently require cultivating or necropsying host tissues. Although parasites can lower a product's final value, they are frequently overlooked in freshwater aquaculture. In addition, parasite infection is the cause of several cases of co-infection with bacteria and viruses. Despite the efforts of numerous researchers worldwide, certain challenges like accuracy, efficiency, and the fate of DNA/RNA remain a concern [9]. Sengupta and others, The DNA method was used in 2019 to find cercaria, one of the major parasites that affect both humans and aquatic animals. To successfully identify this parasite, they utilized both laboratory-based and field-based models. The methods, on the other hand, have some drawbacks, such as the inability to determine the parasite's decay rate or life stage. Therefore, experiments and research need to be carried out under a variety of conditions in order to improve the method's effectiveness. The development of DNA methods for the detection of parasites and pathogens in freshwater is covered in detail in our review. In addition, our research examines how various environmental factors affect DNA degradation [10]. In contrast to the freshwater system, the marine environment has a different rate of DNA and RNA degradation. In marine water, the DNA half-life is found to be 7 to 72 hours, which is shorter than in the freshwater system. Additionally, the rate of degradation varies with the seasons and terrestrial environments. In addition to abiotic factors like depurination-induced hydrolysis and oxidation, biotic factors like heterotrophic microbe-produced extracellular DNases are likely to have a significant impact on the dynamics of DNA persistence.

CONCLUSION

DNA analysis is altering the design and implementation of biodiversity monitoring programs, opening up new possibilities for the future. This instrument has a lot of potential for monitoring aquatic biodiversity, including pathogens and parasites. In order to quickly and precisely identify a number of pathogens in freshwater, a variety of high-end sequencing methods are being utilized. A crucial step in aquaculture is the early detection of pathogens and parasites. Disease outbreaks frequently result in fish deaths in both warm- and cold-water aquaculture systems. Management can be started to stop the spread of disease and possibly speed up the treatment of water. Due to global fish kills brought on by a variety of diseases, aquaculture farmers will be able to save millions of dollars annually.

REFERENCES

1. **Greaves K, Tuene S**. the form and context of aggressive behaviour in farmed Atlantic halibut (Hippoglossus hippoglossus L). *Aquaculture.* 2001; 193: 139-147.
2. **Ellis T, North B, Scott AP, et al.** The relationships between stocking density and welfare in farmed rainbow trout. *J Fish Bio.* 2002; 61: 493-531.
3. **Johansen LH, Jensen I, Mikkelsen H, et al.** Disease interaction and pathogens exchange between wild and farmed fish populations with special reference to Norway (PDF). *Aquaculture.* 2011; 315: 167-186.
4. **Jones NAR, Webster M, Salvanes AGV.** Physical enrichment research for captive fish: Time to focus on the DETAILS. *J Fish Bio*. 2021; 99: 704-725.
5. **Azevedo-Santos Valter M, Pelicice Fernando Mayer, Lima-Junior Dilermando Pereira, et al.** How to avoid fish introductions in Brazil: education and information as alternatives. *Natureza & Conservação*. 2015; 13: 123-132.
6. **Hardy JT.** The sea surface microlayer: Biology, chemistry and anthropogenic enrichment. *Progress Oceano.* 1982; 11: 307-328.
7. **Reche Isabel, D'Orta Gaetano, Mladenov Natalie, et al.** Deposition rates of viruses and bacteria above the atmospheric boundary layer. *ISME J.* 2018; 12 (4): 1154–1162.
8. **Wurl Oliver, Holmes Michael.** the gelatinous nature of the sea-surface microlayer. *Marine Chem.* 2008; 110: 89-97.
9. **Österblom H, Crona BI, Folke C, et al.** Marine ecosystem science on an intertwined planet. *Ecosys.* 2017; 20: 54-61.
10. **Halpern BS, Frazier M, Afflerbach J.** Recent pace of change in human impact on the world's ocean. *Sci Rep.* 2019; 9: 11609.