ISSN 2347-3614

UNIQUE JOURNAL OF PHARMACEUTICAL AND BIOLOGICAL SCIENCES

Available online: www.ujconline.net

Research Article

# STUDYING HISTOPATHOLOGY OF BLACK GILL DISEASE IN MARINE SHRIMP OF BANDAR ABBAS COAST

Sadeghi Limanjoob Reza[1*], Pourdavood Mahdi[2], Kargar Jahromi Hossein[3,4], Syahmard Nahid[5], Bathaee Seyed Hamid[6], Mahmoudi Teimourabad Saeid[6], Farzam Mohammad[7]

[1]Department of Aquatic Animal Health, Veterinary School, Kazerun Branch, Islamic Azad University, Kazerun, Iran
[2]Agricultural Education Center , Fars, Iran
[3]Zoonoses research center, Jahrom University of Medical Sciences, Jahrom, Iran.
[4]Young Researchers Club Elite, Jahrom Branch, Islamic Azad University, Jahrom, Iran
[5]Department of Physiology, International Branch, Shiraz University, Shiraz, Iran
[6]Department of science, Institution of Supreme Education and Industry of Maragheh, Maragheh ,Iran
[7]Department of Anatomy and Embryology, International Branch, Shiraz University, Shiraz, Iran

Received 20-01-2014; Revised 15-02-2014; Accepted 11-03-2014

*Corresponding Author: **Sadeghi Limanjoob Reza,**
Department of Aquatic Animal Health , Veterinary School , Kazerun Branch , Islamic Azad University , Kazerun , Iran .
Tel: +989173243418 E-mail: dr.r.s.limanjoob@gmail.com

## ABSTRACT

**Background:** Black gill syndrome is caused by Phovazrium solani at shrimp. Diseases such as Viberriyoz, Mikoz as well as the presence of heavy metals such as copper and cadmium can provide the context of this disease. This disease is causes because of the stress and weakened immune system that was caused by these factors. Distinct factor of this disease is macroscopic and microscopic Malanize of shrimp's gills. Other pathological symptoms of this syndrome are Hyperpelazi and hypertrophy of gills and accumulation of Hemosits at gills. Given the importance of nutrition and export of shrimp, the aim of this study is the histopathology examination of black gill disease at marine shrimp of Bandar Abbas coast which is one of the important nurturing areas of shrimp.
**Methods:** In this study, 100 marine shrimp of Bandar Abbas coast are preyed and after fixation by Podison fixing solution are transferred to lab of Kazerun Azad Islami university veterinarian department and histopathology sections are prepared and finally prepared samples were examined and the results were reported as photographs and tables.
Results: The results show that the risk of this syndrome is 34% at marine shrimp population of Bandar Abbas coast. Also, histological finding showed that there are not hypertrophy and necrosis at gill cells.
**Results and Discussion:** According to the mentioned matters, it can be stated that bad environmental conditions, certain bacteria attack and fungi and nutritional deficiencies can cause black gill disease by weaken the immune system of shrimp.
**Keywords:** Black gill disease, Fusarium, Malanize, Marine Shrimp.

## INTRODUCTION

Gills in shrimp as the only respiratory member and one of the main involved organs play role at adjusting Hemolymph osmotic process and regard to delicate and touch ability of this organ against pathogens and poisons, it is regarded as one of the most important organs in diagnosis of the shrimp disease [1].
Each body systems of shrimp are studied briefly to better recognition; blood flow system in shrimp is open kind (par foot special). Shrimp's heart is muscular, small and without organized form. It is located at Picard cavity and a series of the arteries carry blood to all parts of the body[1,2].
Nervous system of shrimp is similar to convoluted, but is larger in comparison to body. It is comprised of a nervous cord and a set of nervous nodes. Nerve fibers radiating from each of these nodes and go to various organs of the body and control the operation of various devices [1,2]. Shrimp's muscles are fully developed and all voluntary movements of animal are done by this device. Shrimp's body muscles are composite and entirely are located within exoskeleton and connect different parts of the body[3].
One of the most common diseases is fungal black gills disease. Fusarium is the cause of this disease and death of this disease is very high especially for Panos and Zhapunikos shrimp and there is not treat way for this disease currently. The causes of this disease are conical Macrocnids that are evolution from strings. This disease is happened at Panos shrimp rarely and maybe this is because of lack tendency of this species to hide itself among rocks[3].

In Japan, black disease risk factors are incomplete fungal which is like Saprolegnia. Saprolegnia are found at pool nurturing of shrimp and are introduced as Phovazrium solani by Professor Ekosa at 1971. Gill of the infection shrimp has many black points. When fungal infection is severe, gills or gill lamellae are fully devastated by fungi. Conidia during transferring from cultivation pool to shrimp's body, however some others died within two weeks. Experiments on dead shrimps proved that conidia and strings are penetrated within the gill lamellae and dark brown spots surround them[3].

In 1981, Chinafisher newspaper reported that black gill disease are seen in Panos Modon shrimp at Tainan, Taiwan and the color of water in pools will red because of extreme reproduction of brown Dinoflazhel. And it caused extreme damages at shrimps[3].

Tainan Marine Laboratory studies showed that the cause of black gill disease is food residue that results in water quality changes. Daily water replacement for one week is therapy method. Because water replacement stimulates shrimp to molt and prevent disease and in conclusion the disease improve[3].

The investigation determined that Fusarium solani fungus and possibly other Fusarium types can cause disease. Also, Fekomist species like Adkinsilad and Halifturus types are recently isolated from gill cuticle wastes[2,3].

All Pnayydeh family are infected this fungi, but some of them like Panos Zhapnikos Vineos Kalifornisis specially in early stages are sensitive and some of them like Panos and Anami Vinos Estili Rosteris have little sensitive. On the other hand, some of them like Panos Monodon have high resistant in comparison to itself. Some of Fusarium types are not be able to cause black gill disease at Panos Doraom shrimp, but cause infected gill and Antenna lines. Sensitive ages to this disease are youth and mature[2,4]. According to mentioned matters and death of shrimp because of this disease, the aim of this study is Histopathology examination of black gill disease at marine shrimp in Bandar Abbas coast.

## MATERIALS AND METHODS

In this study, marine shrimp are preyed from several preserve Bandar Abbas coast by fishing boat powered and immediately injected to abdominal shrimp by using insulin syringe of Davidson's fixing solution and after several latitudinal cut at shrimp's body; they were transferred to Davidson solution that was at least twice the size of the shrimp and then transferred to the histopathology laboratory for microscopic sections. Then gill are isolated from the shrimp body for doing histopathology pathologist study and after cutting surrounded wastes by scalpel razor, it is located at tissue processing machines to other tissue stages are done to prevalence of gill tissue of black on the amount Mlanyzasyvn gill, gill necrosis, hypertrophy of gill cells in the samples studied and the results are reported in Table and Figure.

## RESULTS

The study which was conducted over a hundred pieces of shrimp living in Bandar Abbas showed that mentioned shrimps have black gill disease so that after shrimp gill histopathology examinations of study, 34% of those infected Melanizasion, i.e. black gill syndrome and 45% of those infected necrosis especially in the secondary slides. Approximately 9% of gill cells showed hypertrophy. Results are given in Tables 1, 2 and 3.

**Table 1: The amount of gill Melanizasion at marine shrimp of Bandar Abbas**

| Severit / Row | + | ++ | Sum |
|---|---|---|---|
| Percent | 44 | 56 | 100 |

**Table 2: The gill necrosis in marine shrimp of Bandar Abbas**

| Severit / Row | + | ++ | Sum |
|---|---|---|---|
| Percent | 63 | 37 | 100 |

**Table 3: The amount of gill hypertrophy at marine shrimp of Bandar Abbas**

| Severit / Row | + | ++ | +++ | Sum |
|---|---|---|---|---|
| Percent | 59 | 17 | 24 | 100 |

Gills at shrimps play role as the only respiratory member and one of the primary organs involved in the regulation of the osmotic process and given the delicate nature of the organ being exposed to pathogens and toxins in front of the limbs and most essential Diagnosing shrimp is considered (Figure 1). In infected samples, some wastes are observed that including influential penetration of Hemosits at Lakuna space, in some cases, creation of a node structure of Hemosits is malanined by konun (Figure 2), great of epithelial layer lamella , swollen gills , hypertrophy (Figure 3 ) , adhesion ultimately split lamella necrosis (Figure 4 ) was lamella.

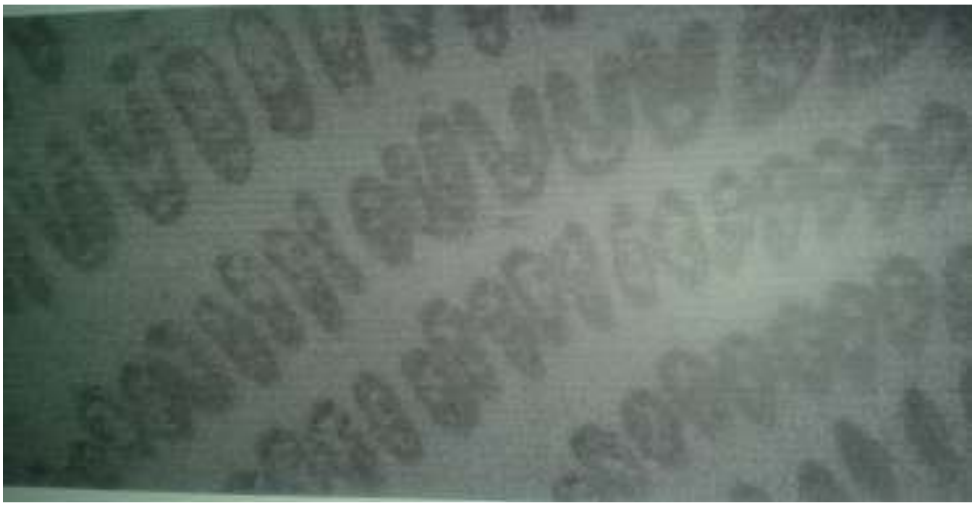

**Figure1: Longitudinal section of normal gills, magnification 400, hematoxylin eosin**

**Figure 2: Longitudinal section Melanization and hypertrophy of gill cells, magnification 400, hematoxylin eosin**

**Figure 3: Longitudinal section of gill cell hypertrophy, magnification 100, hematoxylin eosin**

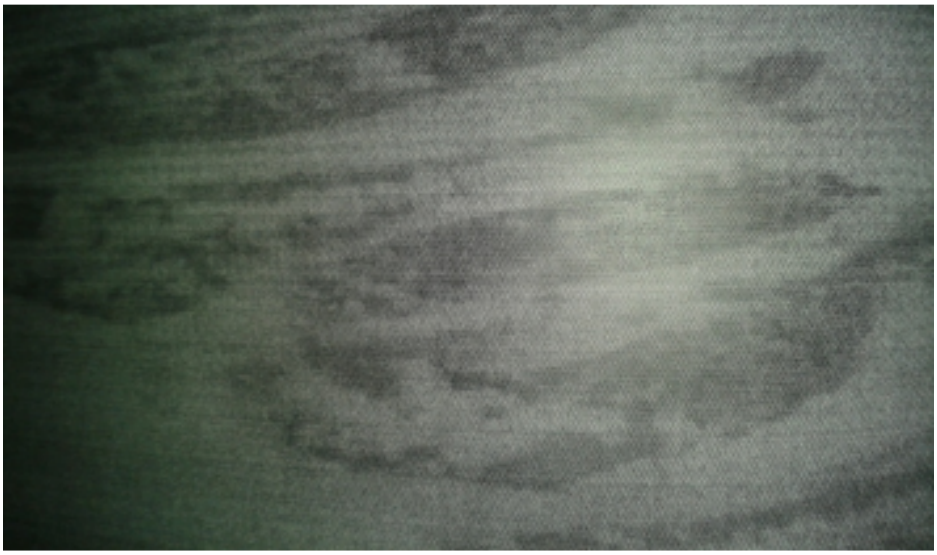

**Figure 4: Cut a length of gill necrosis cells, magnification 100, hematoxylin eosin**

Macroscopic lesions observed in this study include darkening of the cuticle, cuticle localized corrosion, fogging, hepatopancreas, sometimes opaque of muscles and existence of melanin pigment at gills (Figure5).

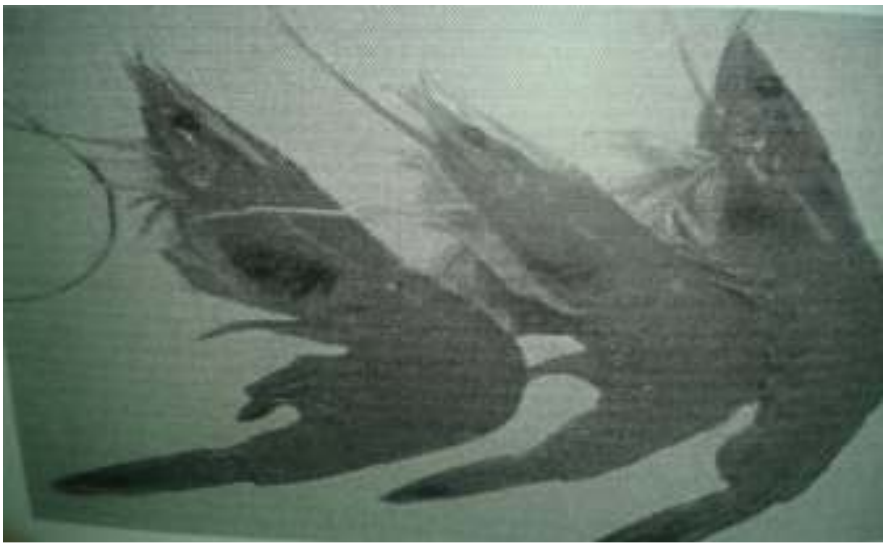

**Figure 5: Clinical symptoms of shrimp infected black gill disease**

## DISCUSSION

Black gill disease is a syndrome caused by accumulation of melanocytes can be detected in the gills. Black or brown pigments presented in gills are melanin which accumulated at inflamed areas of necrotic tissue. Black gills event is usually happened after toxic exposure and inflammation-causing chemicals such as cadmium, copper, potassium permanganate, ozone, oil, acids, ammonia and nitric. Other caused factors are diseases like Vibrios, Mikoz, infection, Mycobacterium and ascorbic acid deficiency. We found that about 34% of shrimps are affected by black gill disease by studying 100 pieces of Bandar Abbas shrimps.

Ghaednia et.al.at a study on 578 green tiger shrimp at Bushehr, recognize totally 719 fungal Koloni from external surfaces, gills, Hitopankras and nurturing pool water and in this study Fusarium species were included 78.7 percent[5].

Kar and Nasagar have separate nearly 500 species from marine environment in India that few of these fungal were pathogenic for shrimps [6]. Ishii Kava at 1968 has been reported outbreak that resulted in 100% mortality in shrimp in Japanese[7].

Experimental infection of shrimps while Fusarium solani were injected into fresh skin wounds resulted in 100% mortality over the past two weeks. Black gill disease in pink shrimp has been established by expose to 763 cadmium chloride microgram per liter for 15 days[6].

Lightner state that Fusarium cause mortality in shrimp aquaculture ponds that are in poor condition and that the stress in terms of adult shrimp are more sensitive[4].

Brook et.al.at 1994 stated that the environment can have significant impact on shrimp health and maturity. And environmental change in one parameter can affect the other variables and other types of environmental variables that are

associated with this disease include high temperatures, low dissolved oxygen, sudden changes in salinity, season of the year, and toxins such as nitrite, ammonia, heavy metals, crude oil, the death toll after inadvertently occur during sample preparation and also attacks bacteria and certain fungi in environmental conditions[8].

Regard to mentioned researches, it can be stated that outbreak of black gill disease at preyed shrimps from Bandar Abbas coast because of bad environmental condition because of oil pollution, heavy metals, tumbling of shrimp ecosystem, air heat, high levels of suspended solids in the water and imposition that is resulted after death objectively during sample preparation is effected on the intensification of this disease. In fact, we can say that a series of lowering population factors of marine shrimp at Bandar Abbas like mentioned factors can be ground black gill disease.

Macroscopic gross lesions observed in this study include darkening of the cuticle, cuticle localized corrosion, fogging, hepatopancreas, muscles and sometimes opaque pigment melanin in the gills.

Brrok et.al.at 1990 stated that damage that is caused by Fusarium solani usually are black or melanin and is limited to head, tail, gills and muscles are attached to the cuticle and its outbreak have been not reported at internal organs [9]. Synderman stated that after outbreak of Vibriozis Bacterial disease, black gill is happened that cause black darkening of the cuticle, appendages and gills.

Microscopic lesions observed in this study consisted of Hemosits ample penetration at Lakuna space, creation of nodal Hemosits with melanin center, the long lamella epithelial layer and inflammation, adhesion coverslip to each other, Nekrozfilament gill, gill hyperplasia and melanin gill.

Bian et.al.T 1981 at histopathology black gill disease examination reported melanin Kotikoli lesions, granulomatous nodules, hemosits accumulation and melanin gill and also gill hyperplasia that observed made in this study is like researcher's work [10]. Inflammation changes at shrimp's gills like Hemosits accumulation at Lakuna space, inflation, Felament spout and Felamini pitelium atop may be a simple defensive mechanism that cause surface reduction and area expanse of gills that osmotic adjustment applied to perform well [11-13]. In seems that inflammation changes at infected shrimp in this study are not a specialist response to stimulus environmental factors.

## CONCLUSION

According to mentioned matters, it can be stated that the bad environmental conditions, certain bacteria and fungi attack and nutritional deficiencies can provide context to black gill disease by weaken the immune system of shrimp. Also, in the present study, lesions that resulted from this disease include darkening of shrimp's body, darkening Hetopankras, melanin corrosion at Kotikol and black gill and from microscopic perspective, consisted of Hemosits nodal structure with melanin center at gill, ample penetration at Lakuna space, gill inflation and Hyperplazi, adhesion and Lamella necrosis.

## REFERENCES


1. Shakuri M, Handbook of shrimp reproduced principle, Assistance of aquaculture nurture, Directorate General Education and Extension, 1374, pp. 12-37.
2. MajidiNasab A., Farmed shrimp disease, first edition, Nourbakhsh publication, Tehran, 1377, pp. 16-134.
3. Shakibazadeh SH, Brine shrimp nurture, second volume, first edition, Assistance of aquaculture nurture, Directorate General Education and Extension, 1379, 243.
4. Lighter DV. Epizootiology of two mycotic disease in the culture of penaeid shrimp. Proc.Int. colloq. Invertebr. Pathol 1, P:179-183.
5. Ghaednia B., Fungal Flora green tiger shrimp farmed in Bushehr. Fisheries Research Institute of Iran, Tehran, 1382
6. Karunagar I, Umesha RK. Microbial diseases in shrimp aquaculture in marin microbiology, facets and apportunities, Edithed by Ramaiah N (National institute of oceanography, Goa, India). 2004; 165-186.
7. Ishikawa Y. Preliminary report on black gill disease of the kuruma prawn, penaeus japanicus. Fish pathol, 1998; 3: 34-38.
8. Brock JA, Main KL. A guide to the cpmmon problems and disease of cultured penaeus vannamei. World aquaculture society, Baton rouge, Louisiana USA. 1994; 10-19.
9. Brock JA, Lightner DV. Chapter3: Diseases of crustacea. Diseases of marine animals, 1990; 4: 245-424.
10. Bian BZ, Equsa S. Histopathology of black gill disease causes by fusarium solani (Martius) infection in the kuruma prawn, Pnaeus japonicus bate. J. fish disease. 1981; 4: 195-201.
11. Bahavan PS, Graldine P. Hiastopathology of hepatopancreas and gills of the prawn macrobrachium malcolmsonii exposed to endosulfan. Aquatic toxicology, 2000; 50: 331-339.
12. Lightner DV. Diseases of cultured penaeid shrimp and prawns. In: C.J. Sindermann and D.V. Lightner (eds) Disease Diagnosis and control in North American marine Aquacultrer.2nd– edition. Elsevier, New york. P: 8-127.
13. Sindermann, CJ. Principal Disease of marin Fish and shellfish, vol.2, 2nd edition. Academic press, New York.


**Source of support: Nil, Conflict of interest: None Declared**