Global Veterinaria 12 (3): 287-291, 2014
ISSN 1992-6197

DOI: 10.5829/idosi.gv.2014.12.03.82316

The Investigation of Genetic Traits and the Recognition of Genotypes of *Liza salinse* In Mazandaran Sea, 2013

Haleh Akhavan Niaki and Ali Akbar Samadani

Cellular and Molecular Biology Research Center,
Babol University of Medical Sciences, Babol, Iran

Abstract: One of the best methods of fish genetics is to study the polymorphism and cytology. Correspondingly, the recognition of genotypes and analysis of electrophoresis of *Liza saliens* (An economical important bony fish) and also polymorphism of this fish in different parts of Caspian Sea can preserve and expand the stock of this creature. The aim of this survey was to evaluate of genotypes, electrophoresis, polymorphism, Transferrin, hemoglobin and total protein of *Liza saliens* in Sari and Bandar Gaz regions across the coastlines of Mazandaran Sea (Globally know as Caspian Sea) in 2013. Based on the random sampling of 100 *Liza saliens* obtained by fishing in these regions (Sari and Bandar Gaz) and after the observation of the species in the transferrin of *Liza saliens* in these areas, polymorphism transferrin emerged in the forms of 1 or 2 band by the number of Codominants. There have been significant differences in the population of fish in both studied areas and there have been more significant differences observed for *Liza salinse* in Sari than in Bandar Gaz. Genotypes of the study were AA. AB. BB. AC. CC. BC. and all of the meristic and morphometric factors of the fish in Sari represented larger quantities than those in Bandar Gaz. In comparison with the samples obtained in Bandar Gaz, genotype BB has been more frequent in Sari. With regard to these studies, there have been more coefficients of variance for countable factors influenced by genetic factors such as the number of fin rays and the number of up and down scale on the lateral lines of the fish in Sari than those in Bandar Gaz. Also, there have been more morphometric factors like the length of head, standard length and the height of body in the fish caught in Sari than those caught in Bandar Gaz.

Key words: Genotype · Polymorphism · *Liza saliens* · Mazandaran Sea

INTRODUCTION

Liza saliens is an economical important bony fish in Caspian Sea [1]. The molecular study of fishes in order to conserve the biodiversity in Caspian Sea is very important and remarkable [2, 3]. In this respect, the genetic study of *Liza saliens* and the study of differences about the populations of different areas that are not considered as yet are very important in describing the condition of this fish in Caspian Sea.

Liza saliens was first grafted from Black Sea to Caspian Sea by the Former Soviet Union and nowadays, this type of fish is found across the Iranian coastlines where there is much fishing done every year [4, 5]. This type of fish has pelagic breeding and unlike other types of the fish from Caspian Sea, they do not migrate for spawning to the rivers near the borders of the sea [1, 2, 5].

The largest proportions of the bony fish in Caspian Sea are found in small rivers. Plenty of natural spawning places have disappeared in rivers and shore-ponds. Therefore, the natural breeding of this type of fish is affected and it leaves unsatisfying effects that causes a serious decrease in the stocks.

Correspondingly, the shortage of stores, the need of site for fishing, over fishing practices and extravagant fish processing have decreased and imposed pressures on all the stocks of the bony fish recently. All of the above-mentioned factors show that fishing has been excessively done across the Iranian borders in Caspian Sea.

Corresponding Author: Ali Akbar Samadani, Cellular and Molecular Biology Research Center,
Babol University of Medical Sciences, Babol, Iran.

Therefore, genes, genotypes and phonotype of this type of fish are often changed as a result of a lack of selection and random confluence [6-9].

On the other hand, there have been problems for this type of fish that have changed the population of the fish in recent years. The application of the biochemical markers and the classic studies of morphology render useful information about the circumstances of the genetic variety of the fish [10-13]. In addition, these studies provide comparative data in examining the changes and possible reasons for numerous studies that are conducted for scientists and some other creatures on the hemoglobin variations and the health levels of creatures.

The use of biochemicals for this type of fish and differences in the species by protein electrophoresis are common in most countries [14-17]. Biochemical specifications contain patterns such as protein and genetic issues and they are used to determine the genetic distinctions among populations [10,18,19].

However, the need of information for the morphological and biochemical particularities of *Liza saliens* necessitates comprehensive studies to be performed on the biological states of the fish.

MATERIALS AND METHODS

This study has been conducted by random sampling in the populations of *Liza saliens* in Sari and Bandar Gaz. Biometrical and laboratorial operations continued in the center of coastline (The Sari and Bandar Gaz) from spring to winter seasons in 2013 and the physical and biochemical conditions of the fish were examined. Biological experiments were performed by electrophoresis on the poly acryl amid Gel to examine the protein, hemoglobin and Transferrin. After fishing, biometry operations were performed at first. Factors considered in biometric analysis. The length of body, the length of fins, eye diameter, the length of head, standard length and the length of snout.

These factors are parts of morph metric features. In doing meristic biometry, some factors need to be viewed. These factors include the number of fin ray the number of above and bottom scale lateral line. The changes in the meristic factors stem from genetic sources.

The tools and equipment used for the biometry contain sensitive scale, biometry ruler, band ruler, Pelt and scissor. After registering the physical specifications of the fish, the habituations are considered for biochemical studies. Habituation is examined from the tail of the fish. The level of blood taking from each fish is about 2 (ml). The blood samples are preserved in vial in the liquid nitrogen and transferred to the laboratory where serum is separated from blood. The vial that includes blood is centrifuged at 3000 (rpm) for 10 minutes after isolating. It is isolated and placed in the Eppendorf for scoring the samples and it is then retained for electrophoresis analysis in freezer. The samples should be taken out of the freezer and they can directly be poured in the Gel split-comb about 20(Micro liter). In another method, samples that are mixed in the cold water or the Tris Buffer solution with Glycerol (14%) can be mixed equally. The proportion of the serum is 1 or 2 in the above-mentioned mixture. Pouring one drop of BrumFenel in the Eppendorf can highlight the movement of bands in time of electrophoresis practice.

The number of the factors such as the length of snout, the length of head, the length of body, the height of body and standard length can be studied by assessing the morphometry of *Liza saliens*. The biometry features are counted around the 5% (mm) difference for classifying the data. The morphometry analysis is used according to the Casselman *et al.* [14] and the electrophoresis information for the analysis of the heterogeny test is performed by the Chi Square test.

Data collection was done by performing the tests and recording the specifications. The information on the characteristics of the fish was collected and the approach was performed by authorities. The sampling of the fish is performed in different coastline areas. The laboratory al experiments were conducted for the recognition of the genotype. By the ANOVA test, the samples were recorded and the data were compared. The analysis of the genes and the protein were done by Chi Square test. The population of samples in this studycontain 100 fish that were selected randomly from fishing in Sari and Bandar Gaz area

RESULTS

The genotype is obtained after examining the results of biochemical investigation that is carried out by the electrophoresis in serum, total protein and transferrin of *Liza saliens* in laboratory (Table 1).

Correspondingly, it can be concluded that the number of genotype (BB) that is related to the *Liza saliens* in Sari is less than others. In the other hand, the abundance of fish in Bandar Gaz is less than that in Sari, Gene (BB) is greater in proportion in forming the genotype (Table 2).

Table 1: Abundance in transferrin Genotype of fishes

Place of sampling	The number of sample	AA	AB	BB	AC	CC	BC
Sari	total(50)						
Station1	12	3	_	7	2	_	_
Station2	11	2	2	5	2	_	_
Station3	10	1	2	3	1	1	2
Station4	9	2	_	3	1	2	1
Station5	8	2	3	2	_	1	_
Bandar Gaz	total(50)						
Station1	10	2	2	4	2	_	_
Station2	9	3	2	3	_	1	_
Station3	9	_	1	2	1	4	1
Station4	11	1	1	3	4	1	1
Station5	11	_	1	8	1	_	_

Table 2: Allelic frequency of Transferrin

The place of sampling	TFA Transferrin Genotype (AA)	TFB Transferrin Genotype (BB)	TFC Transferrin Genotype (CC)
Sari zone	15.6	100	43.8
Bandar Gaz zone	13.2	100	7

Table 3: The meristic data of fishes in Sari and Bandar Gaz zones

Average mean	A4	A′	P1.1	P′	V	V′	D	D′	D′′	C8.8	C	LL	Lla	LLB
Sari	3.9	9	1.1	13	3	9	5	9	1.2	8.1	6.3	44	65	7.3
Bandar Gaz	A0	8.6	P1.1	14	3	8.4	3.9	8.9	1.1	C0.5	6	43	7	7
Variance	0.2	A′	0.15	P′	V0.5	V′	D0.3	D′	D′′	0.3	C′	LL	Lla	LLb
Sari	A0	0.8	P	1.1	0.1	0	0.2	3.2	0	C0.7	0.3	3.2	0.5	0.5
Bandar Gaz	0.4	0.3	0	1.1	V0.3	0	D0.5	0.7	0	0.5	0.2	2.1	0.4	0.4
Standard deviation	A0	A′	0.4	P′	0.5	V′	0.4	D′	D′′	C7.2	C′	LL	Lla	LLb
Sari	1.8	0.8	P	1.1	V10	0.3	D	1.5	1.1	6.1	0.6	1.8	0.5	0.7
Bandar Gaz		0.6	0	1.1	9.1	0.3	13.8	1.2	1.1		0.4	1.8	0.4	0.6
Coefficient of changes		A′	1.1	P′		V′	12	D′	D′′		C′	LL	Lla	LLb
Sari		1.3		6.6		3.8	2	5.9	0		5.9	3.1	3.8	6
Bandar Gaz		48.4		6.2		3.2		5.6	0		6.1	3	4.2	5.8

A= The number of hard rays of anal fin A' = The number of soft rays of anal fin

P = The number of hard rays of pectoral fin P' = The number of soft rays of pectoral fin

V = The number of hard rays of ventral fin V' = The number of soft rays of ventral fin

C= The number of hard rays of caudal fin C' = The number of soft rays of caudal fin

LL = The number of scale on the lateral line LLa = The number of scale upon on the lateral fin

LLb = The number of scale under the lateral fin D = The number of hard rays of first dorsal fin

D'= The number of soft rays of dorsal fin D" = The number of hard rays of second dorsal fin

Table 4: The comparison of some proportions between morphologic particulars of this fish

Some of the morphologic qualifications	Sari zone	Bandar Gaz zone
HDS	%26	%24
HEH	%9	%8
SSD	%98	%94
VSD	%49	%46
DSD	%50	%47

HDS= The proportion of the length of the head to standard length.

HEH= The proportion of the length of the head to height of body.

SSD= The proportion of the length of snout to standard length.

VSD= Distance from the beginning of snout to ventral fin to standard length.

DSD= Distance from the beginning of snout to dorsal fin to standard length

Also the tables indicate that co dominant allele (B) is more frequent in Sari, while the second more frequent co dominant allele is (C). However, in Sari, co dominant (B) is entirely more abundant than compared to Bandar Gaz.

With reference to the above tables, we can deduce that the fish in Sari represent better growth sand it has more P value in terms of morphological factors (Table 3). To study the polymorphism of transferrin and hemoglobin proteins in Sari and Bandar Gaz, the results of this search are grouped into two sections (Morphologic and Genotype qualifications), (Table 4).

Evident physical differences in *Liza saliens* report a variety of this type of fish and their adaptation in different conditions.

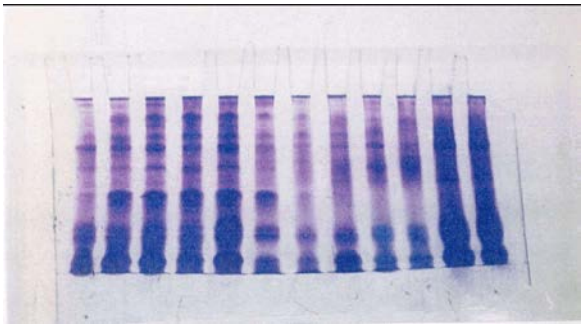

Fig. 1: The protein alleles after separation on the polyacrylamide Gel.

DISCUSSION

The study of the construction of polymorphism transfer in the total number of proteins and hemoglobin and the analysis of the parts of cells are performed for a great population of animals [2].

This method of study can be applied for the study of the population of fish. In this investigation, two factors are taken for examining the possible differences in the population of *Liza saliens* in both areas (Sari and Bandar Gaz).

The protein variety is employed via electrophoresis just as this variety bears a genetic origin. Furthermore, electrophoresis variety is one of the most important tools in studying the animals. Also, it is a practical tool in studying genetic subjects.

If there are two great proportions of populations that represent distinctive electrophoresis patterns, the interchange of genes among the populations will be very low or nothing.

There have been no contradictory results as yet, because one of these groups is created by increasing the generator of the other group, or both of these groups are broken down and divided recently.

In another way, both groups and populations with the same alleles may separate from each other but they can be affected by a selection mechanism [13]. However, to identify different populations and to obtain more information, there cords of groups should be studied.

The important point considered in this study is the distinction between *Liza saliens* in Bandar Gaz and Sari. Attaining authentic and reliable information is very important in performing the breeding activity [15]. Another quality observed in this study is morphologic characteristics, but the majority of the morphologic specification is not influenced by genetic factors. Therefore, it is not an appropriate method to recognize populations since the distinction between the species is not very significant [16]. However, the characteristics that are not affected by genetic factors are useful in studying the concept of performance in the populations. These traits can represent the genetic concept of population more clearly. Electrophoresis and morphologic characteristics demonstrate a large body of information on the structure of populations and both of these groups of information should be taken in doing this type of research.

Concerning the physical and biochemical distinctions observed among the types of the fish in Sari and Bandar Gaz in this research, we could not acknowledge that, the fish have various populations. However, we can compare the genetic and morphologic specifications in these areas.

Regarding the aforementioned arguments in this study, the distinction and recognition of some populations in *Liza saliens* are the main purposes.

In addition to the variations of genotypes, the morphologic indicators are different in various species of *Liza saliens*. On the other hand, we can identify the *Liza saliens* from other types of fish by physical specifications.

Genotype (BB) of the fish in Sari area has represented greater abundance than Bandar Gaz area.

The maintenance, recognition and separation of the alleles require a comprehensive plan as well as better conditions in reforming the breeding on the based on population liability. This aim is not addressed by the information about physical characteristics only. Therefore, the recognition of biochemical markers is very essential in determining the genetic conditions. Also, we can obtain information on the population conditions via the biometry specifications.

In this study, examining the biochemical markers, determining and recording of biometry particulars are performed in connection to the comparison made between *Liza saliens* in Sari and Bandar Gaz.

CONCLUSION

It could be concluded that the population of *Liza saliens* in different parts were not the same and also in both groups the same alleles may separate from each other's but they can be affected by a selection mechanism.

REFERENCES

1. Vosughy, G.H., 2011. The fishes from freshwater, Tehran University Press, Iran.

2. Farhadi, A., 2010. Fish Genetic and breeding, the Ministry of Islamic Culture and Guidance.
3. Morgan, M.J., 2004. The relationship between fish condition and the probability of being mature in American plaice (Hippoglossoides platessoides). ICES Journal of Marine Science, 61: 64-70.
4. Sogard, S.M., 1992. Variability in growth rates of juvenile fishes in different estuarine habitats. Marine Ecology Progress Series, 85: 35-53.
5. Verdiell-Cubedo, D., M. Torralva, A. Ruiz-Navarro and F.J. Oliva-Paterna, 2013. Fish assemblages in different littoral habitat types of a hypersaline coastal lagoon (Mar Menor, Mediterranean Sea). Italian Journal of Zoology, 80: 104-06.
6. Verdiell-Cubedo, D., F.J. Oliva-Paterna and M. Torralva, 2006. Condition of Gobius cobitis (Pallas, 1811) juveniles in the Mar Menor coastal lagoon (SE Iberian Peninsula): Effects of inter-and intraspecific fish competition. Scientia Marina, 70: 303-10.
7. Rezvani, R., 2002. Molecular study of the population of economical fish, the Fish Research Institution of Iran, pp: 50.
8. Vasconcelos, R.P., P. Resi-Santos, V. Fonseca, M. Ruano, S. Tanner and M.J. Costa, 2009. Juvenile fish condition in estuarine nurseries along the Portuguese coast. Estuarine, Coastal and Shelf Science 82: 128-38.
9. Ruiz-Navarro, A., R. Moreno-Valca´rcel, M. Torralva and F.J. Oliva-Paterna, 2011. Life-history traits of the invasive fish Gambusia holbrooki in saline streams (SE Iberian Peninsula): Does salinity limit its invasive success? Aquatic Biology, 13: 149-61.
10. Yazdi Samadi, B., 2009. A pamphlet about genetic science, Tehran University.
11. Shahir, M.H., 2000. Agriculture Genetic. Dibagaran cultural and artistic institution, Iran.
12. Pashmi, M. and A. Salehi, 2002. Applied Genetic (Research in laboratory). Olume Keshavarzy Publications.
13. Noory Daloui, M., 2012. The instruction of biotechnology, natural academy and organizationof genetic engineering publication.
14. Casselman, J.M., J.J. Collinsand and E.J. Crossman, 1981. Lake Huron. Canadian Journal of Fish. Aquat. Sci., 38: 1772-1789.
15. Gui, J.F. and Q.Y. Zhang, 2000. Advance in fishery biotechnology for genetic breeding and viral disease prevention in China. Hydrobiology, Sinica, pp: 1-16.
16. Pillary, T.V.R., 1993. Choice of tilapia species for aquaculture. In the biology and culture of tilapias. Pullin, pp: 238-312.
17. Franc¸a., S., M.J. Costa and H.N. Cabral, 2009. Assessing habitat specific fish assemblages in estuaries along the Portuguese coast. Estuarine, Coastal and Shelf Science, 83: 1-12.
18. Gayanilo, F.C., M. Soriano and D. Pauly, 1988. A draft guide to the Complete ELEFAN. ICLARM Software 2. Manila: International Center for Living Aquatic Resources Management, pp: 70.
19. Hoey, A.S. and M.I. McCormick, 2004. Selective predation for low body condition at the larval_juvenile transition of a coral reef fish. Oecologia, 139: 23-29.