

Original article

Fauna and habitat of aquatic arthropods of Kashan in 2010

Dehghani R¹, Zarghi I², Aboutalebi M³, Barzegari Z⁴, Ghanbari M⁵

Abstract:

Background: Given the importance of arthropods in medical and life sciences and information on the composition of such arthropods in this study was conducted during 2010 in the Kashan. **Methods:** Descriptive study and sampling at 13 locations and over 39 times in 2303 on the number of larvae, nymphs, Pupa and adults were collected from Lentic and Lotic waters. Samples collected after the transfer to the laboratory using a Stereo microscope and identified using morphological keys used were identified. **Results:** Total 2303 samples over 39 times the sampling of the Order Diptera, with 1,287 cases (55.8%), crustaceans, with 579 samples (25.2%), Order Trichoptera with 158 samples (6.9%), Order Ephemeroptera 153 samples (6.7%), Order Odonata with 61 samples (2.6%), Order Heteroptera with 26 samples (1.1%), Order Coleoptera with 26 samples (1.1%), Order Plecoptera with 13 sample (0.6) were identified. From Crustacea Class, three orders of the, Amphipoda to 405 numbers (70%) of Lotic water, Ostracoda to 144 (24.9%), Copepoda to 30 (5.1%) from the Lentic waters was collected. **Conclusion:** In This study, for the first time, from Crustacea subphyllum ,order of Ostracoda and Diptera order, Ceratopogonidae, Eryphidae, Dixidae families are reported .Therefore can be concluded that the aquatic arthropods Fauna Kashan is very rich. Considering that some of these insects have a role in the transmission or harassment of human and environmental balance are important, and with molecular methods is recommended that more specific studies done in this field.

Keywords: fauna; aquatic; arthropods; habitat; Kashan

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Introduction

Aquatic arthropods are the group of animals which live in the lotic and lentic water as a stage of its lives. Some of them live near waters and somehow depend on it. Arthropods live in different aquatic habitats, except marine and oceans. These arthropods can be frequently found near the vast aquatic environments, seas and rivers. Most of the aquatic ecosystems are suitable environment for special species of arthropods. These arthropods enrich the area in terms of

biological view¹. Aquatic arthropods play an important role in nutritional chain of other animals such as Fish and Vertebrates. Some of them such as insects, orders Trichoptera(Insects) and Ostracoda (Crustacean) has been considered as index for quality of water. Also some immature stages of them has been evaluated in Toxicological studies^{2,3}. Huge parts of fresh water around the world as habitats for aquatic arthropods have been changed because of

1 Rouhullah Dehghani, Professor, Department of Environment Health of Kashan Medical Sciences University, Kashan, Iran.

2 Iran Zarghi, Lecturer, Department of Public Health and Management, Faculty of Health, Mashhad University of Medical Sciences, Mashhad, Iran.

3 Mahbobeh Aboutalebi, Department of Environment Health of Kashan Medical Sciences University, Kashan, Iran.

4 Zohreh Barzegari, Department of Environment Health of Kashan Medical Sciences University, Kashan, Iran

5 Maryam Ghanbari, Department of Environment Health of Kashan Medical Sciences University, Kashan, Iran

Corresponds to: Iran Zarghi, Department of Public Health and Management, Faculty of Health, Mashhad University of Medical Sciences, Mashhad, Iran. Email: i.zarghi@gmail.com

malapropos humanistic actions⁴. Biological diversity of these arthropods in fresh water is totally important in studies related to them. Ongoing studies about these arthropods and doing any change in to destroying species and reducing their population is symptom of inappropriate situation⁵. Aquatic Arthropods play an important role in aquatic's nutrition including Fish. Among farmed aquatics, Salmon is the most popular one, but the way of nutrition and farming it, is an important factor in keeping its taste. One of the most crucial factors in its meat's taste is its nutrition. Arthropod Gammarus from Amphipod is it's the natural nutrition which affects the meat's color and taste. Studying Gammarus, its dispersal and gain the ways of farming and reproduction, can help whom try to farm Salmon and meet some needs of human's protein⁶.

Apart from biological importance of aquatic arthropods in medical view, since understanding their role in transmission of diseases, they have been studied frequently. From the medical view Culicidae family of mosquitoes are the most important insects that include Anopheles, Culex and Aedes. There are more than 2800 species of these mosquitoes around the world⁷. Since these mosquitoes' important role on transmission of Malaria, Filariasis, Encephalitis, and other types of diseases due to Arbovirus and pain caused by their bite, they have been introduced as the main group of arthropods in medicine and health care studies. At present problem of diseases transmitted by this family, is the most considerable health issue in different areas including developing countries and South Africa. These diseases polluted more than 500 million people and caused to death of 1-3 million people annually around the world⁸. Aquatic arthropods live in different aquatic habitats except seas and oceans. These arthropods occupy great part of fresh water. Since Iran has different hemispheres, natural and artificial floats, it is a proper place for farming these arthropods which some of them play important role in transmitting main diseases and some of them must be considered as biological national wealth. Widely Studies has been done about larvae of Culicidae family including city of Kashan⁹. Kashan is considered as a tropical area of Iran, which different areas of it especially in south part have temporarily and seasonal aquatic floats. These floats are the substantial habitats for aquatic arthropods. Since some stages or whole life of these animals is in aquatic environment, so proper situa-

tion of water can be an important factor in their reproduction¹⁰. Given the importance of habitat in farming of aquatic arthropods, this investigation has been done in order to reach the mentioned goal in the year of 2010.

Material and Methods

Descriptive study and sampling at 13 locations and over 39 times in 2303 on the number of larvae, nymphs, Pupa and adults were collected. Collecting instruments were Hand lens, Small sieve, pond net, blunt forceps, fine brush, dropper, vial and jar. These samples, based on their type of habitat and activity, were collected in diverse techniques. Arthropods, order Ephemeroptera, order Odenata and samples of Crustacea, larvae and pupas of Aedes and Culex were collected by small sieve in different parts of stream. Tabanids larvae from the inside of plants and aquatic Algae were collected by pond net and blunt forceps. Plecoptera larvae and Ephemeroptera nymph by extracting the stones in water, Simulium larvae by extracting aquatic plants, stones and woods pieces in water were collected in fairly quickly speed. Aquatic insects which swim quickly and mostly live in Lentic water, were collected by pond net. Samples collected after the transfer to the laboratory using a stereo microscope and identified using morphological keys¹¹⁻¹⁵ used were identified (Results, based on order and family of aquatic arthropods, illustrated in table and compared. The study was approved by the local ethical committee.

Results

Total 2303 samples over 39 times the sampling of the order Diptera, with 1,287 cases (58.8%), Crustaceans, with 579 samples (25.2%), order Trchoptera with 158 samples (6.9%), order Ephemeroptera 153 sample (6.7%), order Coleoptera with 26 samples (1.1%), order Plecoptera with 13 sample (0.6%), were identified. From Crustacea subphylum, three orders of the Amphipoda to 405 numbers (70%) of Lotic water, Ostracoda to 144 (24.9%), Copepoda to 30 (5.1%) from the Lentic waters was collected. Jevinan and Ghahrood, from the diversity of orders point of view, were the richest places with five orders and Nashalj, Golestaneh, and Niasar with two orders were the poorest one. Most frequent collected number of samples was Naragh with 427 (18.5%) in three times sampling and the least one was Nashalj with 48 samples (2%) (Table 1).

Samples of Plecoptera Orders, Ephemeroptera,

Table1-Dispersal of aquatic arthropods of Kashan based on Place

Arthropod Place	Diptera	Tricoptera	Hetroptera	Ephemeroptera	Coleoptera	Odonata	Plecoptera	Crustacea	Total	Perce nt
Jevinan	135	-	-	10	8	-	5	206	364	15.8
Golestaneh	168	-	-	20	-	-	-	-	188	8.2
Naragh	258	131	-	35	3	-	-	-	427	18.5
Barzak	100	-	-	5	-	25	-	-	130	5.7
Margh	155	-	3	-	-	-	-	75	233	10.1
Nashalj	33	15	-	-	-	-	-	-	48	2
Dehzireh	138	-	-	-	-	11	-	85	234	10.2
Shoorab	39	-	12	-	3	-	-	45	99	4.3
Abshirin	40	-	-	13	-	3	-	-	56	2.5
Khomb	47	-	3	-	-	22	-	100	172	7.5
Niasar	116	-	-	30	-	-	-	-	146	6.3
Ghohrood	33	12	8	-	9	-	-	68	130	5.6
Abyaneh	25	-	-	40	3	-	8	-	76	3.3
Total	1278	158	26	153	26	61	13	579	23.3	100
Percent	55.8	6.9	1.1	6.7	1.1	2.6	0.6	25.2	100	

Tricoptera and Odonata from Lentic waters and other Orders were collected from Lotic waters. Samples of Diptera were collected in both Lentic and Lotic waters. From Order of Diptera, Culicidae families with 639 samples (49.7%), Simuliidae with 436 samples (33.9%) Chironomidae with 112 samples (8.7%), Ceratopogonidae with 90 samples (7%), Eryphidae with 4 samples (0.3%), Tabanidae with 3 samples (0.2%), were identified. Naragh was the richest area at the point of diversity in order of Diptera families view with 20% of total Diptera. Poorest area was Abyaneh with 2 families in this order.(Table 2)

Discussion

This study showed, there are 7 orders of aquatic insects and three orders of Crustacea in Lentic and Lotic waters of Kashan. This evaluation shows that this city with a tropical and dry weather is totally rich in fauna arthropods. Compared with other areas, it has the most frequent Orders and Families. Regarding to other studies , which have been done in colder weathers with more resources of Lotic and Lentic waters , it seems despite the fact that Kashan has less resources of water, reducing the average temperature of environment causes enrichment in orders and families of aquatic arthropods. On the other hand, since this area divides into two mountainous and desert climates, arthropods of both cli-

mates could be found in their own habitats. Order of Diptera with more than 55% amount, was the most frequent Orders of aquatic insects. Study of this Order has been considered in priority, because of its importance in medical studies. Results are consistent with the previous studies' results^{9,10}.

Study showed that in city of Kashan , Amphipoda(Scud) and Ostracoda (Seed shrimp) are the most populated ones and live in Lotic and Lentic waters. Existence of these Crastacea in this area is the fact which is reported for the first time. These arthropods are very important and they can be used as quality index³, therefore more studies on description, ecology, biology and environmental needs of these animals is recommended. 6.9 percent of collected samples belong to Tricoptera Order which is consistent with Dehghani's study in 2005. In contrary to studies about arthropods around the world, there is no report or study about descriptive status, diversity and biological situation of insects in Iran⁹. It seems importance of these insects have been ignored. It might be ignored because of agricultural and health pest's importance by authorities. About 6.7% samples of this study were Ephemeroptera Order. Hojjat and Dehghani et al. mentioned the existence of two families of them^{9,15}. In this study we collected about 2.6% of Odonata. Targari and

Table 2-Dispersal of Diptera in Kashan based on family

Arthropod Place	Dixidae	Eryphidae	Simulidae	Culicidae	Chironomidae	Tabanidae	Ceratopogonidae	Total (Percent)
Jevinan	-	-	-	135	-	-	-	135 (10.5)
Golestaneh	-	-	-	168	-	-	-	168 (13)
Naragh	-	-	197	40	3	3	15	258 (20)
Barzak	-	-	-	95	5	-	-	100 (7.8)
Margh	-	-	155	-	-	-	-	155 (12)
Nashalj	-	-	-	18	15	-	-	33 (2.6)
Dehzireh	3	4	-	17	54	-	60	138 (10.7)
Shoorab	-	-	-	24	-	-	15	39 (3)
Abshirin	-	-	-	40	-	-	-	40 (3.1)
Khomb	-	-	-	12	35	-	-	47 (3.7)
Niasar	-	-	56	60	-	-	-	116 (9)
Ghohrood	-	-	28	5	-	-	-	33 (2.5)
Abyaneh	-	-	-	25	-	-	-	25 (2)
Total	3	4	436	639	112	3	90	1287 (100)
Percent	0.2	0.3	33.9	49.7	8.7	0.2	7	100

Dehghani's studies show that from this order, there are a lot of orders in Iran. This study is consistent with the previous ones (16). About 1.1% samples of this study were Coleptera, 1.1% Heteroptera, and 0.6% Plecoptera. Dehghani has mentioned in his study to Coleptera and Heteroptera, but in this study Plecoptera signified for the first time in city of Kashan⁹. In this study the most populated family of

aquatic arthropod, was larvae and pupa of Aedes and Culex from Culicidae family, its amount was 49.7%. Zaim reported two species of Aedes and Culex from Aran and Bidgols fresh waters¹⁷. From this family, It has been reported a lot of species around the country. Since this family's medical importance, it has been studied frequently in the world^{9,10}.

In this study 33.9% of Diptera Order, Simulidae family were signified which is in consistent with Dehghani et al.'s study. Members of this family live in mountain areas and clean fresh waters⁹. Tabanus type of Tabanidae family was signified. Larvae of this insect have knobs around (Graber organ) its body which eases its cognition. This family's insects spread around the world. Dehgani et al. and Abbasian mentioned its description in Iran, They also introduced its cognition key which is consistent with our study^{9,18}. In this study from Diptera family, Dixidae and Eryphidae families are signified and introduced for the first time. Also family of Ceratopogonidae signified for the first time in city of Kashan.

Conclusion

As the results show, Amphipoda and Ostracoda Orders of Crustacean and Eryphidae, Dixidae and Ceratopogonidae families of Diptera are reported in city of Kashan. It is inferred from this study, great amount of these arthropods is very crucial in the natural balance of environment and its key role in healthy function of natural habitats and provide the nutrition of aquatics. It is recommended entomologists and biologists study more on these insects and their effect on environment's health in Order to signify biological values of these arthropods and signify their damages in case.

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