Exploring the Diversity of Odonata (Dragonfly and Damselfly) Fauna of Malka and Mahaban Valley District Buner, Pakistan

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Abstract

The current preliminary study was conducted on Odonata fauna of Malka and Mahaban valley, district Buner during October 2019 to October 2020. In this exploration, the focus was on diversity of Odonata fauna of Malka and Mahaban valley district Buner, Pakistan. In this research, a total of 80 specimens of Dragonflies belonging to 11 species under 6 genera and 2 families similarly 70 specimens of Damselflies belonging to 7 species, 6 genera and 5 families were reported from Malka and Mahaban valley Buner. The Dragonfly families are Gomphidae and Libellulidae. The reported species are Onychogomphus bistrigatus *(Hagen in Selys, 1854),* Trithemis festiva *(Rambur, 1842),* Trithemis aurora *(Burmeister, 1839),* Brachythemis contaminata *(Fabricius, 1793),* Orthetrum pruinosum neglectum *(Burmeister, 1839),* Orthetrum anceps *(Schneider, 1845),* Orthetrum triangulare triangulare *(Selys, 1878*), Orthetrum chrysis *(Selys, 1891),* Orthetrum chrysostigma louzonium *(Burmeister, 1839),* Neurothemis fluctuans *(Fabricius, 1793) and* Crocothemis servilia servilia *(Drury, 1773). The Damselfly families are* Calopterygidae, Chlorocyphidae, Euphaeidae, Platycnemididae *and* Coenagrionidae. *The species reported are* Neurobasis chinensis chinensis *(Linnaeus, 1758),* Aristocypha quadrimaculata *(Selys, 1853),* Libellago lineata lineata *(Burmeister, 1839),* Bayadera indica *(Selys, 1853),* Copera marginepis *(Rambur, 1842),* Pseudagrion rubiceps *(Selys, 1876) and* Pseudagrion decorum *(Rambur, 1842). Among Dragonflies, family Libellulidae dominated with (5 genera and 10 species) followed by Gomphidae (1 genus and 1 species). Whereas among Damselflies, family Chlorocyphidae dominated with (2 genera and 2 species), Coenagrionidae (1 genus and 2 species), Calopterygidae, Euphaeidae and Platycnemididae (1 genus and 1 species). Important steps should be taken to save the population of endangered species and further molecular research work will be carried out in Malka and Mahaban valley district Buner Pakistan. The reported species also play active role in biological control.*

Keywords: *Pseudagrion decorum*, Buner, Damselflies, Odonata fauna.

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Introduction

Damselflies and Dragonflies are called Odonates, and mostly found flying over field, river, meadows, ponds and lakes etc (Westfall & May, 1996). There are three suborders of order Odonata, Zygoptera (Damselflies) with 17 living species, Anisoptera (Dragonflies) with 8 living species and Anisozygoptera (primitive Dragonflies) which has been given a new name of Epiprocta with 1 living species (Mitra, 2006; Subramanian, 2014; Kalkman et al., 2008).

Damselflies and Dragonflies are elegantly colored, amphibiotic, delightful predaceous stitching needles, representing the large aquatic insect in the animal kingdom (Das et al., 2015). The Dragonflies have long, slender abdomen, larger globular eyes that makes up a large portion of head, have short antennae and long wings (Van Tol, 2005). The adult Damselflies are different from Dragonflies by few conspicuous features i.e. they have button-like small eyes, their wings are identical etiolate basally and held upright at rest while in case of Dragonflies hind wings are wider basally and held flat and dejected at rest. Damselflies are weak fliers than Dragonflies (Garrison, 2011).

Odonates are earliest and attractive insects that ever-wandered earth with vestige records that dates back to the Permian period 230-280 million years ago (Subramanian, 2009). Though, current families of this order ages from upper Jurassic and Cretaceous period (150-60 million years ago) (Westfall & May., 1996). The total number of the Odonates are 6500 and 60 new species are discovered in Africa in 2015 (Dijkstraet al., 2015), in which 499 species and subspecies under 139genera in 17 familie is reported from the oriental region (Prasad & Varshney, 1995).

Most specimens of Odonata are confined a specified habitat at different stage of life of life particularly the stenotopic species (Orr, 2003; Watanabe et al., 2004). The respective species are very sensitive to different environmental condition like to flow of water and sunlight (Chovanec & Raab, 1997). The Dragonflies and Damselflies are among the most energetic and enthusiastic of all insects (Nelson et al., 2011). As they are vital, Dragonflies frequently seen hovering back and forth or rushing about regularly, especially along the coasts and over the swamps, pond, rivers and lakes, from early sunrise to late sunsets (Williams et al., 1992).

Dragonflies and Damselflies are prodigious predators both in their larval and adult stages of life. They feed mainly on living organisms. Their larvae have mechanoreceptors for detecting prey visually, principally as sit-and-wait predators. Prehensile mouthparts that extend for capturing the prey. The adult Odonates typically eat small flying insects, which they can detect by their globular eyes. They have spiny legs which are used as

basket to net prey and the prey is moved forward to strong mandibles during flight. Most Odonates feeds during flight and this is not an easy task except being an exceptional flyer (Corbet, 1999). A single adult of Dragonfly eats 300-400 gnat per day (Thompson & Watts, 2006). The larvae of Damselflies possess caudal gills and hover by propelling with their legs, whereas the larvae of Dragonflies possess large inner gills and move by spurting water from their abdomen. Adult Odonates have elongated wings with an obvious nodus and a pterostigma (Norberg, 1972).

As they are predator at both stages of life i.e. larvae & mature, therefore they play key role in the forest ecosystem food chain. Their larvae feed on larva of mosquito on water to control the spread of malaria disease therefore they key role biological control over mosquito larvae hence help in controlling numerous widespread diseases i.e. dengue, malaria, filarial diseases etc (Sathe & Shinde, 2008; Rowe, 2003; Sahle & Ekestubbe, 2001).

In animal kingdom, this is the second largest aquatic order. The Odonates are significant factor of aquatic ecosystem for being the top predators. They sometime play role as a flagship species group. The Odonates are the best indicators of climate change because they are sensitive to climate change (Brown, 1991; Clark & Samways, 1996; Sam ways, et al., 2010).

The Odonates are also used as biological control agents, numerous Odonates species populating in agro ecosystems play a key role that is control of pest's population (Andrew et al., 2008). The Odonate's adults from fields seasonal crops like cotton and rice in response of food search and also to control pest of crops Females eat pests much more than male (Khaliq & Saddique, 1995; Yousaf et al., 1995, 1998), and that's why that have immense economic values and is therefore they are center of global scientists (Khaliq et al., 1993). They also have some curative resources and are used in medicines production in various countries (Dijkstra & Liwington, 2006), for example, Sympetrum species are used for treatment of fever (Zia et al., 2011). The current study underscores the exploration, importance and conservation of Odonata fauna of Mahaban and Malka valley of district Buner.

Materials and methods

Study Area

Buner is a district of Malakand division (Khyber Pakhtunkhwa). The surrounding districts of Buner are Swat in North, Shangla in East, Swabi and Mardan in South, and Malakand agency on West. District

Buner is situated between 34°03' to 34°43' N latitude and 72°10’ to 72°47’ E longitude (Saeed et al., 2013).

Sampling Methodology

The adult Dragonflies and Damselflies were collected by using aerial net in the summer season from ten localities of study area. The names of localities are Khanano Derai, Mujahidin, Nagrai, Charorai, Malka, Mahaban, Tarenan, Kandar, Langar and Daba Nakhtar. The specimen was properly set with the help of setting board and on drying they were labeled and placed in wooden boxes. The photographs were captured using digital camera.

Sample Preservation

The species were properly sat on sitting board and entomological pins were used for pinning the specimen. After proper drying, they were shifted to insect box and Naphthalene balls were placed in the box to protect the species from ants and other predators. After that, the box was deposited in museum of Abdul Wali Khan University Mardan, Buner Campus.

Result

The present study was conducted on Odonata fauna of Mahaban valley district Buner during October 2019 to October 2020. No research work has been done on Odonata fauna of Mahaban valley before, so this is the first study on Odonata fauna of Mahaban valley. During this research, 11 species of Dragonflies under 6 genera and 2 families and 7 species of Damselflies under 6 genera and 5 families were reported. Among Dragonflies, family Libellulidae dominated with 5 genera and 10 species while among Damselflies, family Chlorocyphidae dominated with 2 genera and 2 species. Description of Damselfly species collected from Mahaban valley is given below.

Neurobasis chinensis chinensis (Linnaeus, 1758) (Figure 1)

Morphology

It is a large metallic bronze-green colored Damselfly. Male eyes are blackish brown above and bluish white. Thorax is shimmery green with coppery wash. Legs are long, dark bronze with yellow patches. Abdomen size is 45-50 mm, shimmery green above and sides black below. Wings are 32-38mm in length, fore-wings are transparent, decorated in light yellow with green venation, hindwings are dense in bright metallic green or peacock blue. Female eye color is similar to male eye color

Abdomen is 44-50 mm long, dull iridescent green above and black below. Wings are 36-40 mm long, transparent and light coffee brown with white spots or pseudopterostigma.

Habitat: They are very dynamic damselflies and live near to water surface. The males fly close to water surface while females usually rest on nearby foliage.

Seasonal Occurrence: This species can be found from May to November.

Distribution: This species is distributed in India, Myanmar, Bangladesh, Nepal, Sri Lanka, China, Vietnam, Thailand, Peninsular Malaysia and Sumatra.

Figure 1: Neurobasis chinensis chinensis (Linnaeus, 1758).

Aristocypha quadrimaculata (Selys, 1853) (Figure 2)

Morphology

Male eyes are black color. Thorax is black with yellow patches above & on sides. With dark legs. Abdomen size is 25 mm, black in color and has yellow stripes. Wings are 27 mm long, opaque with black and white ends and light purple strips in the apical parts of hindwings. Female eyes are brownish black and bluish grey. Thorax and legs are similar to male. Abdomen size is 21 mm and has yellow strips laterally. Wings are 31 mm in length, transparent and has a pterostigma.

Habitat: They are terrestrial as well as they live on the coastlines of streams and rivers, etc.

Seasonal Occurrence: This species can be found from May to October.

Distribution: This species is distributed throughout the oriental region.

Figure 2: Aristocypha quadrimaculata (Selys, 1853)

Libellago lineata lineata (Burmeister, 1839) (Figure 3)

Morphology

Male eyes are black-brown up and blue green below. Thorax is bright green yellow on back side and blue patches going on sides. Legs are black in color. Abdomen is 38-40 mm in size, black with medial yellow bands on segments. Wings are 34 mm long, clear with cloud color at tips, having black and extended wing spot. Female eyes, thorax and legs are similar to male. Abdomen is 36 mm in length and similar to male. Wings are 37 mm long, transparent with amber tinged base, without smoky apical spots.

Habitat: It can be found mostly near to freshwater and streams.

Seasonal Occurrence: It can be found from May to September.

Distribution: This species is distributed in India, China, Bangladesh and Nepal.

Figure 3: Libellago lineata lineata.

Copera marginipes (Rambur, 1842) (Figure 4)

Morphology

Male eyes are dark above and green from each side. Thorax is bronze-black along fine yellow patches on sides. Legs are bright yellowish orange in color. Abdomen is 28-31 mm long and greyish blue in color. Wings are 16-18 mm long, transparent with brown pterostigma. Thorax is brown with irregular dark strips on sides. Legs color is brownish. Abdomens is 29-30 mm long and brown in color. Wings are transparent with light brown pterostigma.

Habitat: They are terrestrial as well as can live on bank of freshwater, puddles and shallow water.

Seasonal Occurrence: This species can be found from August to November.

Distribution: This species is distributed in India, China, Sunda Island, Hong Kong, Myanmar, Nepal, Taiwan, Sri Lanka, Bangladesh and Sumatra.

Figure 3: Copera marginipes.

Pseudagrion rubiceps (Selys, 1876) (Figure 5)

Morphology

Male eyes are olivaceous green above, dark orange below and blue beneath. Thorax is green. Legs are yellow, black on outer and rear side. Abdomen is 29 mm long, bronze green, black and azure blue on sides. Wings are 18-20 mm in size, transparent and has reddish brown pterostigma. Female eyes are dark blue above and azure blue below. Thorax has marking similar to male but color is light bluish green. Abdomen is 29 mm in size, marking above the segments are wider than male. Wings size is 21 mm and has rare brown pterostigma.

Habitat: It is found near freshwater, rivers, rests on aquatic vegetation on the banks and breed in marshes.

Seasonal Occurrence: This species can be found from April to September.

Distribution: This species is distributed in Nepal, China, India, Taiwan, Malaysia, Indonesia, Cambodia, Lao and Myanmar.

Figure 4: Pseudagrion rubiceps.

Pseudagrion decorum (Rambur, 1842) (Figure 6)

Morphology

The male eyes are bluish green in color. Thorax is light bluish green. Abdomen is 28-30 mm long, light blue tipped and three fine black lines on mid dorsum. Wings size is 18-20 mm and has a bluish grey pterostigma. Female eyes are olivaceous above, light green below and much different from male. Thorax is blue in color. Abdomen size is 31 mm, yellowish green in color with black marks dorsally. Wings are 20 mm long, and has a dull grey pterostigma.

Habitat: It flies along the banks of freshwater, puddles, stream and river.

Seasonal Occurrence: This species can be found from April to September.

Distribution: It is widely distributed in Oman, Myanmar, Bangladesh, India, China, Sri Lanka and Bhutan.

Description of Dragonfly species collected from Mahaban valley.

Onychogomphus strigatus (Hagen in Selys, 1854) (Figure 7)

Morphology

Male face color is yellow. Eyes are brown. Thorax is yellow with brown stripes on above and lateral sides while pale yellow color below.

Legs are brownish in color with femora is colored yellow. Abdomen is 30 mm in size, yellow and black on each segment. Wings (forewing is 28 mm and hindwing is 26 mm) are transparent with black venation and has pale brown pterostigma. Female has yellow face. Eyes are dark brown. Thorax is pale yellow with brown stripes. Legs are brownish in color with yellow stripe on sides and yellow femora. Abdomen is 32 mm, brown yellow in color and each segment has black color at the end. Wings (forewing is 25 mm and hindwing is 24 mm) are transparent with black venation and has pale brown pterostigma.

Habitat: They live in slow moving water with dense vegetation.
Seasonal Occurrence: It can be found throughout the year.
Distribution: It is cosmopolitan species.

Figure 5: Pseudagrion decorum.

Figure 6: Onychogomphus bistrigatus.

Trithemis festiva (Rambur, 1842) (Figure 8)

Morphology

The male eyes color is black brown and also have tiny grey color spot. The thorax region is coved with purple and also have black color pruinescence and give deep blue appearance. The color of leg is black. Abdomen is 22-28 mm long, black and covered with blue pruinescence. Wings are 26-32 mm long, are clear and also transparent and opaque brown market the base of hind wings and black spot-on wing. The female color is grey below and overall dark brown. Thorax is green-yellow and medial and dark brown stripe is present. Onsides, upturned 'Y' shaped stripe. The legs are yellow from inner side and black from anterior side. Abdomen size is 21-24 mm. medial and lateral stripes are confluent at abdominal segments to enclose a wedge-shaped yellow spot. Wings are 29 mm in size, transparent with dark reddish-brown tip and has black pterostigma.

Habitat: They commonly fly in slow flowing streams and canals. Usually perches on rocks and aquatic plants. They breed in slow-moving streams.

Seasonal Occurrence: This species can be found from May to November.

Distribution: It is widely distributed in Greece, Cyprus, Turkey and throughout the oriental region.

Figure 7: Trithemis festiva.

Trithemis aurora (Burmeister, 1839) (Figure 9)

Morphology

Male eyes are maroon and the brown color on sides. The color of thorax is purple pruinescence with red spots. Legs are dark in color. Abdomen is 21-29 mm long, maroon in color with violet tint. Wings are

24-34 mm in size, transparent with maroon venation and the base has a broad yellowish-brown stripe. Female eyes are purple brownish above and grey below. Thorax is olivaceous with brown median black lateral stripes. Legs are dark grey with narrow yellow stripe. Abdomen is 19-27 mm long, reddish brown with median and lateral black markings. The black markings are convergent at the end of each segment. Wings are 24 mm in length, which clear and transparent also have brown marks at the tips of wings. Wings venation is from brown to yellow with dark brown marking.

Habitat: it is found in marshes area, water channels, ponds and on the side of slow water stream.

Seasonal Occurrence: This species can be found throughout the year.

Distribution: This species is distributed in Japan, Java, Indonesia, Hong Kong, Brunei Darussalam, Nepal, Lao, Cambodia, Bangladesh and Hainan.

Figure 8: Trithemis aurora.

Brachythemis contaminate (Fabricius, 1793) (Figure 10)

Morphology

Male eyes are olivaceous above side color is brown and bluish grey below. Thorax is brown to reddish-brown above with two reddish-brown stripes on lateral side. Legs color is dark brown. The size of abdomen is 18-21 mm and brilliant red in color. Wings size is 20-23 mm, are clear and having red venation. A broad orange patch extending from the base of wing to pterostigma in fore and hindwings and has hoarse wing spot. Female eyes are light brown blue grey at below. The thorax is dull green yellow with tiny brown patches on mid-dorsal and lateral side. Legs are similar to male. Abdomen is 18-20 mm, light olivaceous brown with a mid-dorsal patch. Wings are 22-25 mm and transparent. Hindwings tinted

yellow at the base, rusty pterostigma. The bright orange wing stripe of male is absent.

Habitat: They are commonly found in ponds, marshes, tanks and in terrestrial areas.

Seasonal Occurrence: It can be found all around the year.

Distribution: It is distributed in orientalregion (India, China, Myanmar, Bangladesh, Taiwan, Thailand, Malaysia and Nepal).

Figure 9: Brachythemis contaminate.

Orthetrum pruinosom neglectum (Burmeister, 1839) (Figure 11)

Morphology

Male face is ochreou to light red brown. Eyes are black brown above and blue grey at beneath. Thorax is red brown to pale purple and present hairs on it. Legs are black and reddish brown at the base. Abdomen is 28-31 mm long, brilliant red in color. Wings are 32-36 mm long, and clear. Particularly in adult it has brown color toward the tip. The basal area of fore and hindwing is marked reddish brown. Pterostigma is reddish brown in color. Female face is olivaceous. Eyes are yellowish, covered with brown. Thorax is reddish brown or light ochreous with obscure lateral brown stripe. Abdomen is 30 mm long; tiny black spots are present at border of each segment with dull ochreous. Wings are 27 mm long, similar to male but the basal marking is opaque.

Habitat: It is present in ponds, streams, tanks, ditches and puddles.

Seasonal Occurrence: It can be found throughout the year.

Distribution: It is distributed in Afghanistan, Brunei Darussalam, Taiwan, Thailand and other oriental countries.

Figure 10: Orthetrum pruinosom neglectum.

Orthetrum anceps (Schneider, 1845) (Figure 12)

Morphology

The eyes are dark blue with glossy black color face particularly in male and the thoracic and legs are silky black color. Abdomen is 29-33 mm long, the tip of abdomen has narrow tips and base is broad. Segment 1-2 and 8-10 are black, 3-7 are sky blue and covered with fine hairs. Wings are 37-41 mm in length and transparent. The broad triangular black spots are present on hind wings and also have black pterostigma. Female eyes are brown, very different from male. Thorax is olivaceous green above, frequently steeped from red to brown, and the dark red brown patches are present at the side of thorax region. Abdomen is 29-32 mm long, black without hairs. A middorsal yellow patch runs from segment 1 to 7. Wings are 37 mm in size, transparent steeped with brown. Hindwing tinted with yellow.

Habitat: It is found near marshes, puddles, brooks and freshwater.

Seasonal Occurrence: It can be found from May to October.

Distribution: It is widely distributed in Asian countries (Japan, Taiwan, China, Nepal, Bhutan, Afghanistan and Hong Kong).

Orthetrum Chrysis (Selys, 1891) (Figure 13)

Morphology

Male face is bright red. Eyes are coffee brown above and bluish grey below. Thorax is husky brown. Legs are black. Abdomen is 28-33 mm in size and dark red in color. Wings are 31-38 mm long, transparent and the wing base is colored yellowish-brown. Pterostigma is reddish brown. Female is dark ochreous with black markings. Eye color is similar to male. Abdomen is 25-30 mm and ochreous brown. Wings are 31-36 mm in size, transparent and has yellowish brown pterostigma.

Habitat: It is commonly found resting around marshes, ponds, paddy field and standing streams.

Seasonal Occurrence: It can be found all around year.

Distribution: They are found in India and Sri Lanka to Celebes and Borneo in the east.

Figure 11: Orthetrum anceps.

Figure 12: Orthetrum Chrysis.

Orthetrum chrysostigma louzonium (Burmeister, 1839) (Figure 14)

Morphology

Male eyes are green. Thorax is pruinose light blue. Legs are black in color. Abdomen is pruinose light blue, 3-5 segments are narrowed and has fine black lines. Wings are 30 mm in length, transparent and has black venation. Hindwing has a small yellow stripe at the base, and has yellowish brown pterostigma. Female eyes are green. Thorax is yellowish brown with black borders white band on side. Legs are black. Abdomen is yellow with mid-dorsal line. Wings are 29 mm in length and similar to male.

Habitat: They live in streams, stagnant water, slow flowing water and shallow water.

Seasonal Occurrence: It can be found throughout the year.

Distribution: It is distributed in India, Africa, Europe and West Asia.

Figure 13: Orthetrum chrysostigma louzonium.

Crocothemis servilia servilia (Drury, 1773) (Figure 15)

Morphology

The color of thorax region, male face and eyes are red just like blood. Legs color is reddish. The color of abdomen is red and its length is 24-25 mm. Wings are 27-38 mm in length, transparent and base has orangey red mark and has dark brown pterostigma. While the face of female is yellow in color and brown from above. Olivaceous beneath. The thoracic region is dark brown in color also having dark brown leg. Abdomen is yellowish brown with mid-dorsal black stripe. Wings are 31-37 mm in length, transparent, the basal mark is amber than male and has dull yellow pterostigma.

Habitat: They live in streams, marshes, tanks and ponds.

Seasonal Occurrence: It can be found from April to September.

Distribution: It is distributed in Philippines, Turkey, Malaysia, Armenia, Korea, Afghanistan, China, Sulavesi, Iraq and Iran.

Neurothemis fluctuans (Fabricius, 1793) (Figure 16)

Morphology

The face of adult dragonfly is olivaceous and eyes color are brown to reddish with yellow color below. The thorax region was uniform reddish brown. Legs are yellowish or rusty with black spines. The length of abdomen is 17-22 mm, and the color of abdomen is brown to reddish also

with blackish brown elongate stripe on sides of 2 to 9 segment. The length of wings is 20-25 mm, dark reddish brown from base into proximal end of pterostigma. Pterostigma is dark reddish brown. Female may be isochromatic or heterochromatic forms occur. Abdomen is 18-22 mm in length, olivaceous or ocherous. Wings are 22-28 mm in length, transparent and has dark reddish brown pterostigma.

Habitat: They live in freshwater, terrestrial, stagnant water (swamps, marshes and ponds).

Seasonal Occurrence: It can be found from April to September. It is distributed in Thailand, Bhutan, Singapore Malaysia, India, Indonesia and Cambodia.

Figure 14: Crocothemis servilia servilia.

Figure 15: Neurothemis fluctuans.

Discussion

In the current study, 18 Odonates species was reported under12 genera and 7 families from Malka and Mahaban valley. During the study two families namely Gomphidae and Libellulidae were investigated from Dragonfly. While the five families, Calopterygidae, Chlorocyphidae,

Euphaeidae, Platycnemididae, Coenagrionidae were reported from Damselfly. Among Dragonflies, family Libellulidae dominated with (5 genera and 10 species) followed by Gomphidae (1 genus and 1 species). Whereas among Damselflies, family Chlorocyphidae dominated with (2 genera and 2 species), Coenagrionidae have 1 genus and 2 species, Calopterygidae, Euphaeidae, Platycnemididae (1 genus and 1 species).

Seyab et al., (2015) reported 188 specimens of Dragonflies belonging to 2 families (Libellulidae and Gomphidae), 7 genera and 11 species from Tehsil Tangi, District Charsadda, Khyber Pakhtunkhawa, Pakistan. Family Gomphidae have 11 species (5.85%) and family Libellulidae has 188 species (94.51%) of the total specimens due to which this family was the dominant family of study area.

Present study, show the diversity of Damselfly species was collected from the study area. The reported species were 7 belonging to 6 genera and 5 families. The species are *Neurobasis chinensis chinensis* (Linnaeus, 1758), (Figure.1) *Aristocypha quadrimaculata* (Selys, 1853), *Libellago lineate lineate* (Burmeister, 1839), *Pseudagrion decorum* (Rambur, 1842), *Bayadera indica* (Selys, 1853), *Coperamargi nepis* (Rambur, 1842) and *Pseudagrion rubiceps* (Selys, 1876).

Zada et al. (2016) reported 230 adult specimens of Damselflies under 5 families, 8 genera and 12 species from district Buner, Khyber Pakhtunkhwa, Pakistan. The dominant family was Coenagrionidae under 3 genera and 7 species, followed via family Chlorocyphidae was 2 genera and 2 species and also family Calopterygidae was 1 species.

The current study was explored the diversity of Odonata fauna of Mahaban valley. In this study, the total reported species were 18 belonging to 12 genera and 7 families. In the total of 18 species, 7 species belonged to Zygoptera and 11 species belonged to Anisoptera.

Rehman et al. (2019) reported a total of 238 adult Damselflies (Zygoptera) belonging to 13 species, 10 genera under 5 families from nineteen localities of the district Swabi, Khyber Pakhtunkhwa, Pakistan. Family Coenagrionidae recorded to be abundant family with 07 species and 05 genera followed by Family Chlorocyphidae (3 species and 2 genera) Calopterygidae, Protoneuridae and Euphaeidae (1 species and 1 genera) each.

In the current study, the family Libellulidae was the dominant family belonging to suborder Anisoptera having 10 species under 5 genera while the family Chlorocyphidae of suborder Zygoptera dominated with 2 species under 2 genera.

Usman et al. (2017) reported 725 specimens of the Dragonfly belonging to 3 Families and 6 genera and 9 species city Karak and its surrounding areas, Khyber Pakhtunkhwa, Pakistan. Family Libellulidae

was the dominant family with 7 species under 4 genera while Family Gomphidae and Aeshnidae was recorded with only one species each.
In this current study, the most abundant Damselfly species was *Aristocypha quadrimaculata* (Selys, 1853) and the most abundant Dragonfly species was *Orthetrum pruinosum neglectum* (Burmeister, 1839).

Shaikh et al. (2019) reported 350 specimens under 2 families, 4 genera and 6 species from different localities of the district Jamshoro, Sindh, Pakistan. 3 genera and 3 species belong to family Libellulidae (Anisoptera) and 1 genus and 3 species belongs to family Coenagrionidae (Zygoptera).

Tiple (2012) reported 70 species of Odonata belonging to 12 families, 47 genera from Achanakmar-Amarkantak Biosphere Reserve. Among Anosoptera, family Libellulidae appeared to be dominant with (31 species), followed by Gomphidae, (5), Aeshnidae (4 species), Corduliidae (1 species). Whereas among Zygoptera, family Coenagrionidae dominated with (15 species), Protoneuridae and Lestidae (3 species), Platycnemididae, Calopterygidae and Chlorocyphidae (2 species) and Euphaeidae and Macromiidae (1 species).

During the current study, the genus *Orthetrum* of family libellulidae was the dominant genus with 5 species. The species are *Orthetrum pruinosum neglectum* (Burmeister, 1839), *Orthetrum anceps* (Schneider, 1845), *Orthetrum triangulare triangulare* (Selys, 1878), *Orthetrum chrysostigma louzonium* (Burmeister, 1839) *and Orthetrum chrysis* (Selys, 1891).

Tiple and Chandra (2013) reported 106 Odonata species under 53 genera and 12 families with 14 new species were recorded from Madhya Pradesh and Chhattisgarh States, Central India. In suborder Anisoptera, Family Libellulidae dominated with (39 species) followed by Gomphidae, (10 species), Aeshnidae (4 species), Macromiidae (2 species) and Cordulidae (1 species). Whereas among suborder Zygoptera, family Coenagrionidae dominated with (29 species) followed by Lestidae (6 species), Protoneuridae (5 species) and Calopterygidae (4 species) and Chlorocyphidae (3 species), Platycnemididae (2 species) and Euphaeidae (1 species).

During the current study to explore the Odonata fauna about ten study sites were selected for collection namely Khanano Derai, Mujahidin, Nagrai, Charorai, Malka, Mahaban, Tarenan, Kandar, Langar and Daba Nakhtar. The maximum collection was made in Kandar, Langar and Tarenan.

Dorji, (2014) reported 24 species under 19 genera belonging to 11 families from Toebirongchhu sub-watershed within Punakha Dzongkhag,

Western Bhutan. In this reported 11 families belonging to 7 suborders of Zygoptera and 4 suborders of Anisoptera. Family Libellulidae was the most dominant family having7 genera and 9 species. While the families Coenagrionidae and Calopterygidae have only 2 genera and 2 species each one.

Saha, (2017) reported a total of 32 species of Odonates belonging to 5 families and 24 genera from the West Bengal State University (WBSU) campus, West Bengal, India. Among the Anisoptera, family Libellulidae was the most dominant family with 15 genera and 18 species. While among Zygoptera, family Coenagrionidae dominated with 6 genera and 11 species.

In the current exploration of Odonata fauna of Mahaban valley the rare Dragonfly species was *Brachythemis contaminata* (Fabricius, 1793) and *Onychogomphus bistrigatus* (Hagen in Selys, 1854) whereas the rare Damselfly species was *Bayadera indica* (Selys, 1853).

Selvarasu et al. (2019) reported 30 species of Odonates including 17 species under 2 families of sub order Anisoptera and 13 species under 2 families of Sub order Zygoptera from District Vellore, Tamil Nadu, India. In suborder Anisoptera, family Libelluidae dominated with 12 genera and 16 species while in suborder Zygoptera, family Coenagrionidae dominated with 5 genera and 11 species.

Quisil et al. (2014) reported 18 species belonging to 16 genera and 6 families from Surigao del Sur, Philippines. Out of 18 species, 7 species were belonging to sub-order Zygoptera and 11 species were belonging to sub-order Anisoptera. Overall family libellulidae dominated with 10 species under 9 genera followed by family Coenagrionidae (3 genera, 4 species), Calopterygidae, Chlorocyphidae, Protoneuridae and Gomphidae (1 genus, 1 species).

Conclusion

The current study concluded that Mahaban and Malka valley is diverse from Odonata fauna (Dragonflies and Damselflies). A total reported 11 species belonging to Dragonflies and 7 species belonging to Damselflies from different site of study area. It is also concluded that anthropogenic activities have direct effect on the population of Odonata fauna. A low number of Odonata fauna were recorded in densely populated areas while large diverse number of Odonata fauna were recorded from less populated areas. Important steps should be taken to save the population of endangered species and further molecular research work will be carried out in Malka and Mahaban valley district Buner Pakistan. Odonata species plays active role in biological control.

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