

Research Article

Some Aberrant Specimens of *Puntius sarana sarana* (Ham.-Buch.) from Fresh-Water Bodies of Jammu District of Union Territory of Jammu and Kashmir (India)

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Abstract

Six deformed specimens of *Puntius sarana sarana* (Ham.-Buch.) were observed, over a period of ten years, among fish collections by fishermen from Pargwal wetland, Akhnoor, and Ranbir Singh Pura area (R.S. Pura) of Jammu district and have been elaborated. Deformities observed include dorsal fin injury and naked eye count of six dorsal fin rays (4/2) in one specimen, slightly truncated one specimen and highly truncated and much shortened body along antero-posterior axis (stumpbody) and fins displacement in four specimens. X ray analysis has revealed six well developed and five rudimentary skin embedded fin rays and dorsal fin injury in one specimen and antero posterior irregular compressed vertebrae in five specimens. Dorsal fin deformity in one specimen is caused by a biological predator and *Myxobolus* infection. A possible cause of deformities in other five fish specimens is pesticides and herbicides spray in agricultural fields causing water contamination.

Keywords: *Puntius sarana sarana*, Deformities, Truncated and stumpbody, Vertebral compression, *Myxobolus* sp, Pesticides and herbicides

Introduction

Puntius sarana sarana, among seven *Puntius* spp. distributed in Jammu waters [1], is on record in Kathua [2-6], Samba [7,8], Jammu [9,10] and Udhampur [11] districts of Jammu region. This important food fish attains a maximum weight of 1 kg. Anomalies among genus *Puntius* are rare and have earlier been reported [12,13]. Deformities in other wild fish populations in Jammu waters, due to good water quality and absence of pollution, are rare and have earlier been described [14-29] over a study period of about forty years. During the fish survey of lotic and lentic water bodies of R.S. Pura and Pargwal wetland, for a period of about ten years, six deformed specimens of *Puntius sarana sarana* were noticed among fish collections by fishermen and have been described. Skeletal deformities can influence morphology and growth and can hinder the movement of fishes and, thus, they become less capable to find food and avoid predators. Knowledge of fish deformities is important for a taxonomist, as lack of any proper knowledge of fish aberrations can sometimes lead to wrong fish identification and creation of new species. Deformities occurrences in fish seems to be a good and practical way of assessing environmental quality [30-33], pollution [34-40] and environmental stress [35,41-43].

Topography and Material and Method

Pargwal wetland in Akhnoor is formed by the river Chenab, an important Himalayan river draining Jammu region, before entering

plains in Pakistan. Water flow of the river Chenab in the area is suddenly reduced and there is wide spread of agricultural fields. Spring fed lotic water bodies, having quality water, are widely distributed in the Pargwal wetland and support a rich fish diversity. Ranbir Singh Pura area is plain and has a large number of freshwater streams, ponds and irrigation canals. The area is famous for quality paddy production. Deformed specimens of *Puntius sarana sarana* were seen over a period of ten years among fish collections by fishermen, purchased, photographed and radiographed by digital X ray machine (AGFA).

Observations

Six deformed specimens of *Puntius sarana sarana* were observed during the present fish survey and are described below:

Dorsal Fin Deformity in *Puntius sarana sarana*

This deformed specimen of *Puntius sarana sarana*, measuring 27 cm and weighing 260 g, was seen among fish collections from RS Pura area. It was recognised by injured dorsal fin area and decreased size of anterior and absence of posterior fin rays (Figures 1-3). Study of dorsal fin has revealed the presence of six dorsal fin rays (4/2) against thirteen (4/9) in a normal fish. Microscopic study of injured skin has shown the presence of *Myxobolus* spores in large number.

X ray study of dorsal fin of deformed fish specimen has shown the presence of eleven fin rays, six well developed visible outside the body and five degenerated (Figure 4).



Figure 1: Photograph of normal *Puntius sarana sarana* (Ham.-Buch.)

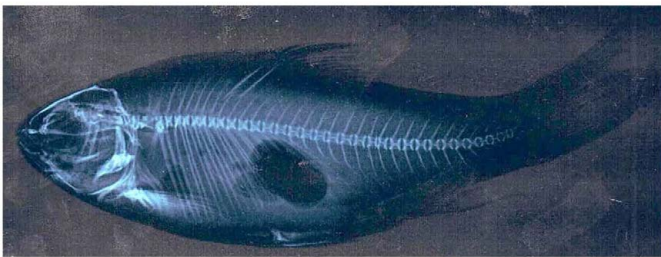


Figure 2: X-Ray photograph of normal *Puntius sarana sarana* (Ham.-Buch.)



Figure 3: Photograph of *Puntius sarana sarana* (Ham.-Buch.) with dorsal fin deformity.

***Puntius sarana sarana* with Slightly Truncated Body, Including Caudal Peduncle, and Dorsal Fin Displacement**

This deformed specimen of *Puntius sarana sarana*, measuring 18 cm and weighing 140 g, was seen among fish collections from RS Pura area. It was recognised by truncated body and displacement of dorsal fin. In a normal fish dorsal fin installation is towards the snout tip than the caudal fin base. In this deformed fish dorsal fin is located towards caudal fin base. Caudal peduncle of this deformed fish is slightly truncated and there is reduction in space between longest anal fin ray and caudal fin base.

X ray analysis has shown the presence of 32 biconcave vertebrae and a urostyle in a normal and abnormal fish (Figures 2 and 6). In this deformed fish first 12 vertebrae are thin and closely placed with normal centra. In the posterior vertebrae, vertebral thickness and centra are reduced and anterior side is concave and posterior side flat, thereby, showing a loss of normal biconcave shape of vertebrae seen in a normal fish (Figures 2 and 6).

Stump and Highly Truncated Body with Displacement of Fins

Four deformed fish specimens of *Puntius sarana sarana* with much deep body shortened along antero-posterior axis (stumpy body) with much shortened trunk compared to a normal fish were seen in Jammu and are described below:

This deformed specimen of *Puntius sarana sarana*, measuring 19.5

cm and weighing 240 g, was seen among fish collections from R S Pura area. Contrary to 3.5 body depth in total body length in a normal fish, in this deformed fish specimen body depth in total body length is 2.16. Dorsal fin installation is towards caudal fin base than the snout tip and longest anal fin ray extends caudal fin base. Contrary to this in a normal fish dorsal fin installation is towards snout tip and there is wide space between longest anal fin ray and caudal fin base. There is a semicircular abdominal protuberance between pelvic and anal fin base. Postdorsally body scales in this deformed fish are short, unequal and overlap. Lateral line short due to truncated body (Figures 7).

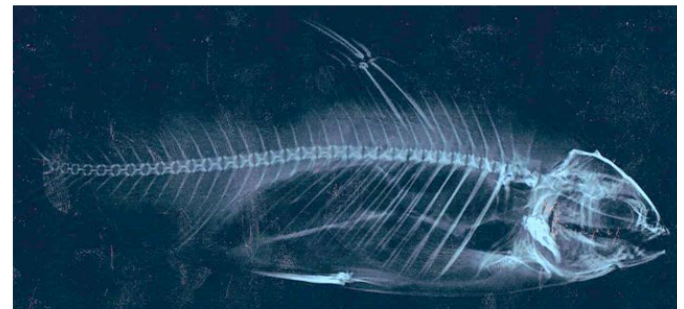


Figure 4: X-ray photograph of *Puntius sarana sarana* (Ham.-Buch.) with dorsal fin deformity.



Figure 5: Photograph of *Puntius sarana sarana* (Ham.-Buch.) showing moderate truncated body.

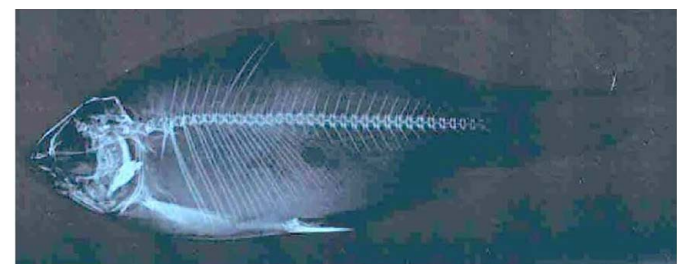


Figure 6: X Ray photograph of *Puntius sarana sarana* (Ham.-Buch.) showing moderate truncated body.



Figure 7: Photograph of *Puntius sarana sarana* (Ham.-Buch.) showing stump and highly truncated body.

In a normal and abnormal fish there are 32 biconcave vertebrae and a urostyle (Figures 2 and 8). Vertebral column in deformed fish is antero-posteriorly is irregularly compressed irregularly and is described as under:

- i) 1st opaque vertebra fused with complex vertebral complex.
- ii) 2nd vertebra highly compressed and opaque.
- iii) 3rd - 12th vertebrae, with reduced inter-vertebral spaces, are slightly compressed.
- iv) 14th to 15th vertebrae compressed and centra reduced.
- v) 16th vertebra normal.
- vi) 17th to 25th vertebrae highly compressed with reduced centra.
- vii) 26th to 28th vertebrae normal.
- viii) 29th to 32nd vertebrae highly truncated, vertebral centra and intervertebral spaces not clear.

This stump and truncated fish, measuring 20 cm and weighing 220 g, was seen in collections from Pargwal wetland area. Its height in total body length is 2.5. In a normal fish dorsal fin installation is towards the snout than the caudal fin base. Whereas, dorsal fin installation in this abnormal fish is more towards caudal fin base than the snout tip. Longest anal fin ray extends caudal fin base. There is a semicircular abdominal protuberance between pelvic and anal fin base. Post dorsally body in this aberrant fish is covered by short overlapping scales and lateral line is truncated (Figure 9).

X ray analysis has shown 32 biconcave vertebrae and urostyle in both normal and abnormal fish (Figures 2 and 12). In this stump and truncated fish vertebrae are variably compressed and are discussed as

below”.

- i) 1st vertebra is fused with complex vertebral mass.
- ii) 2nd to 6th vertebrae highly compressed, attenuated and opaque and vertebral thickness reduced.
- iii) 7th-10th vertebrae have reduced vertebral thickness and intervertebral spaces.
- iv) 11th-27th vertebrae compressed antero-posteriorly with anterior side concave and posterior flat, thereby, losing normal biconcave vertebral shape. Centra, vertebral thickness and intervertebral spaces reduced.
- v) 28th vertebrae normal.
- vi) 29th-30th vertebrae have slightly reduce vertebral thickness.
- vii) 31st-32nd vertebrae highly compressed with rudimentary centra.
- viii) Urostyle and caudal bones normal.

This aberrant fish specimen, measuring 19.2 cm and weighing 260 g, was seen in collections from Pargwal wetland area. Its body height in total body length is 2.2. Contrary to this in a normal fish body height in total body length is 3.5. Dorsal fin installation is towards caudal fin base than the snout tip and longest anal fin ray almost extends caudal fin base. Whereas in a normal fish dorsal fin installation is towards snout tip and there is a long gap between longest anal fin ray and caudal fin base. There is an abdominal protuberance between pelvic and anal fin base. Postdorsally body scales are short and overlap (Figure 11).



Figure 8: Photograph of *Puntius sarana sarana* (Ham.-Buch.) showing stump and highly truncated body.

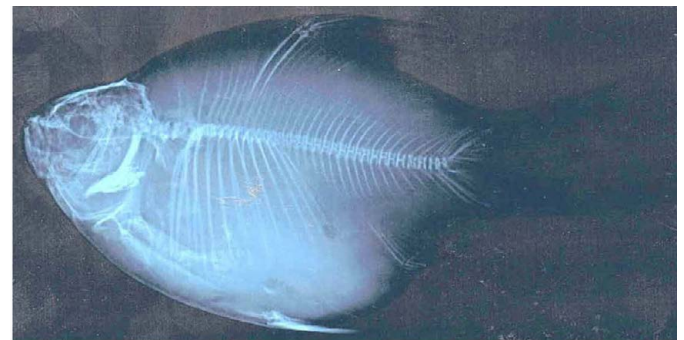


Figure 10: X ray photograph of *Puntius sarana sarana* (Ham.-Buch.) showing stump and highly truncated body.



Figure 9: Photograph of *Puntius sarana sarana* (Ham.-Buch.) showing stump and highly truncated body.



Figure 11: Photograph of *Puntius sarana sarana* (Ham.-Buch.) showing stump and highly truncated body.

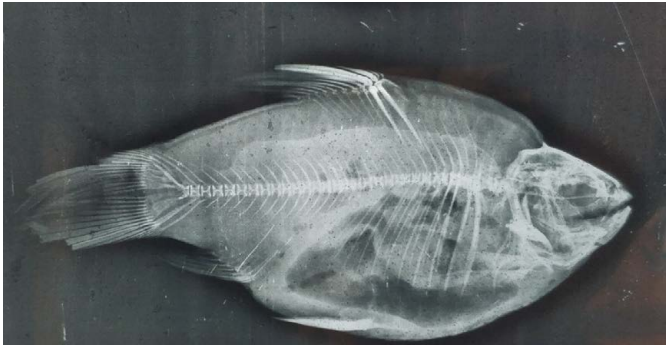


Figure 12: X ray photograph of *Puntius sarana sarana* (Ham.-Buch.) showing stump and highly truncated body.

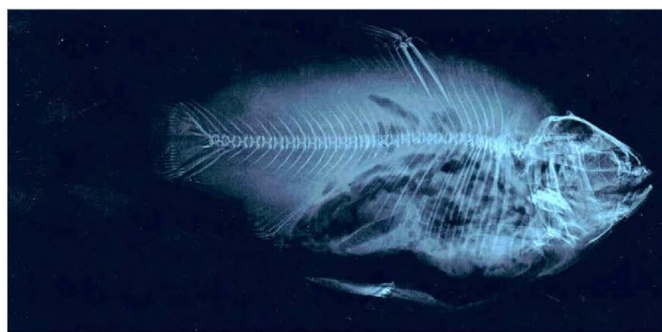


Figure 13: X ray photograph of *Puntius sarana sarana* (Ham.-Buch.) showing stump and highly truncated body.

X ray analysis has shown thirty-two biconcave vertebrae in normal and 31 vertebrae and urostyle in abnormal fish (Figures 2 and 10). There is variable antero posteriorly vertebral compression in this aberrant fish and is described as below:

- i) First four vertebrae compressed and form an opaque fused mass (ankylosis).
- ii) 5th-14th vertebrae, except 4th and 10th compressed vertebrae, are almost normal.
- iii) 15th-17th vertebrae highly compressed and opaque.
- iv) 18th-25th vertebrae slightly compressed with reduced vertebral thickness and intervertebral spaces.
- v) 26th-31st vertebrae almost normal.

This deformed specimen of fish measuring 20 cm and weighing 280 g, was purchased from a fisherman in Pargwal wetland area. Body height in total length is 1.5 in this abnormal fish specimen. On the contrary in a normal fish body height in total length is 3.5. In a normal fish there is a wide space between longest anal fin ray and caudal fin base. Whereas, in the abnormal fish longest anal fin ray almost extends caudal fin base. There is an abdominal protuberance between pelvic and anal fin base. Body scales are highly reduced in post dorsal region.

X-ray analysis has shown the presence of 32 biconcave vertebrae and urostyle in both normal and abnormal fish (Figures 2 and 13). Vertebrae in this abnormal fish specimen are highly compressed antero-posteriorly and are described as under.

1. First five vertebrae highly compressed attenuated, opaque with reduced centra and intervertebral spaces.

2. 6th to 14th vertebrae irregularly compressed.
3. 15th to 16th vertebrae highly compressed and attenuated with opaque centra.
4. Posteriorly, 16th to 27th vertebrae show a gradual increase in vertebral thickness and intervertebral spaces.
5. 28th to 32nd vertebrae and urostyle normal.

In all the above described four stumpy body fishes (Figures 8, 10, 12 and 13) with variable compressed trunk and caudal vertebrae, some pleural ribs are double and some irregularly fused. Whereas, in a normal fish. There are double pleural ribs on trunk vertebrae (Figures 2 and 4).

Discussion

Collection of only six deformed fish specimens of *Puntius sarana sarana* in Jammu district, over a period of ten years, suggests a rare occurrence of such fishes in Jammu waters. This is because they are less abundant or because of the decreased viability of abnormal fishes in their natural habitat as they easily fall prey to the predators. This poor record of deformed fishes is also due to good water quality of water bodies in the area of sampling and absence of industrial pollution [34-40]. Record of these adult fishes suggests that deformities are not fatal and these are able to avoid predators and feed normally.

Vertebral anomalies commonly reported among fishes are lordosis, kyphosis, scoliosis, ankylosis, coiling, duplication, compression etc. Among the presently described fishes one specimen of *Puntius sarana sarana* sampled from RS Pura area has shown dorsal fin deformity, with five rudimentary and six well developed fin rays and presence of *Myxobolus* spores in the skin. This dorsal fin rays deformity is caused by *Myxobolus* infection and is in accordance to the earlier observations [16]. Shortening of dorsal fin rays and wound can also be due to some biological predators.

Five specimens of *Puntius sarana sarana* have shown antero-posterior variable degree of vertebral compression and there is absence of any spinal curvature. Absence of any severe vertebral anomalies (spinal curvature) in wild caught fishes have also been reported by earlier workers [13,19,31,44]. Vertebral compression in *Tor tor* and *Tor putitora* from the river Chenab, Akhnoor, Jammu, has been attributed to fast currents in their breeding grounds, along the river Chenab [19]. Vertebral column compression among the five specimens of *Puntius sarana sarana*, under discussion, cannot be attributed to currents as these fishes have been sampled from sluggish water bodies in plain areas of R S Pura and Pargwal wetland.

Absence of any industry in the area of present fish study suggests that aberrations, under discussion, are not due to industrial and sewage water pollution, as deformed fishes are abundant in polluted waters [17,34-40].

Common use of pesticides and herbicides in widespread agricultural fields in R.S. Pura and Pargwal wetland causing water contamination may be an important factor inducing morphological and vertebral aberrations during developmental stages and have earlier been reported [45-50].

More research on water quality, heavy metals and pesticides is required to identify the factors causing stumpy body and vertebral compressions.

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