



# A Mini Review on the Studies of Gastrointestinal Tract of Teleost Fishes in Indian Subcontinent



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## Abstract

A large body of information exists on the variety of teleost fishes which abound Indian subcontinent. The present review summarizes in chronological order of the research carried by various investigators on the teleost fishes of this important region. Efforts have also been made to identify the knowledge gaps and the strategy to fill such lacunae. Expectedly, this review will serve as a ready source of document to have an overview of the existing information of the GIT on the extant teleost fishes of Indian subcontinent.

**Keywords:** Histomorphology; Gastrointestinal tract; Teleost fishes; Indian subcontinent

## Introduction

The gastrointestinal system (GIT) has evoked considerable interest amongst anatomists and physiologists due to notable correlation of the GIT structural features with the dietary habits of the organism. Hence, large number of studies have been carried out on the morphology, anatomy and histology both at light and ultrastructural level of the various segments of the GIT of variety of fish species and the existing literature on this aspect has been extensively reviewed by many workers from time to time [1-8]. The Indian subcontinent abounds with large piscine biodiversity harboring nearly 2300 different fish species and the survey of literature reveals that a good number of extant teleost fishes of Indian subcontinent have been extensively studied.

It is, therefore, desirable that the existing information on the GIT of the fishes of Indian subcontinent must be reviewed and documented to serve as a reference point of the cumulative source of literature for the workers in this important area. The critical appraisal of the documented literature in this area suggests that there has been a gradual evolution of knowledge of the structural details of GIT which was dependent upon the availability of the analytical tools and techniques. It is worthwhile to mention that one of the earliest documented study on GIT of Indian fishes was carried out by Sarbahi [9] on the morphology of *Lebeo rohita*, an important herbivorous fish which was followed by another study of Mohsin [10] on the morphology of the GIT of a carnivorous fish *Anabas testudines*. Thereafter, a long gap of nearly one decade existed during which no major study on the GIT of Indian fish species was documented in literature.

The subsequent period of 60s and 70s witnessed a resurgence of interest on the studies of GIT of Indian fishes by different workers

[11-19] but such studies were mostly confined to morphology of predominantly carnivorous fishes belonging to either carp or air-breathing catfish. At this point, it is important to acknowledge the voluminous contribution made by Khanna [20] who gave a comparative account of GIT of large number of teleost fishes of Indian subcontinent. Such studies were further extended by the same group to include aspects like comparative account and histomorphology, distribution of taste buds and mucous secreting cells of bucco-pharyngeal region and morphology and histology of intestine of Indian *Teleostei* [21-26]. During the period of 1950-1970, an overwhelming number of studies were carried out on anatomy and histology of GIT based exclusively on feeding habits i.e. carnivores, herbivores and omnivores categories.

The studies of Pasha [27-29] on three different fishes i.e. *Megalops cyprinoides*, *Tilapia mosambica* & *Mystus gulio* with aforesaid different feeding habits i.e. deserve special mention. Most of the contemporary workers also focused on specific GIT segment-based studies such as on single or comparative account of oesophagus, stomach and intestine to highlight the morphological and functional significance of each region of GIT of the fishes such as *Mystus seenghala* [12], *M vittatus* [30], *Colisa fasciata* [19] & *Anabas testudineus* [4]. Interestingly, most of these studies remained confined to either carps or air-breathing fishes which may be due to their wider abundance and economic significance. A limited number of studies were carried out mostly on Indian major carps like *Labeo rohita* [31], *Catla catla* [14], *Cirrhina mrigala* [32] & *Labeo calbasu* [33] describing their GIT changes concomitant with various life cycle stages of these fishes. Literature pertaining to the histochemical localization of mucopolysaccharides and some enzymes on the various segments of GIT is limited [34] and often confined to the anterior part of the GIT.

Moreover, no concerted effort has been made to localise various cell types associated with the secretion of digestive juices which facilitate the process of digestion. More focused studies on large number of Indian teleosts are warranted to fill the existing lacuna of knowledge on this important aspect. Abidi & Parwez [35] described the qualitative differences in the glycoconjugates moiety in oesophagus of *Heteropneustes fossilis* where neutral glycoprotein was predominantly present with certain amount of acidic moiety. The comparative study of gastric mucosa of *Mystus cavasius*, *Oreochromis niloticus* & *Gudusia chapra*, revealed the predominant presence of neutral glycoprotein suggesting thereby the neutralised effect of acid environment on the superficial layer [36].

In order to get an idea of the finer structural details of the internal surface area of GIT, Sinha and co-workers have carried out extensive SEM studies largely on Indian major carps and catfishes [37-43] and similar studies have been made on snow trout *Schizothorax curvifrons* by Mir & Channa [44], *Mystus vittatus*, *Liza parsia* & *O. mossambicus* by Chakarbarti & Ghosh [45] and *H. fossilis* by Samanta et al. [46]. Curiously, this reviewer has come across only one study on the TEM details of the GIT of Indian catfish *H. fossilis* & *O. niloticus* by Samanta et al. [47]. It seems clear from the above details that morphohistological and anatomical features of the alimentary canal of different Indian *Teleostei* are well documented. However, the great degree of variations in the structural details of the GIT are inevitable largely due to the great diversity in the piscine fauna and also the variations in the dietary habits of the fishes.

## Conclusion

Following the first documented report on the GIT of Indian *Teleostei* in 1939, a long gap with virtually no reported studies existed. However, there was a sudden resurgence of interest on this important aspect where the studies were mostly confined to morphology of predominantly carnivorous group of fishes belonging to either carp or air breathing catfishes. Subsequent studies were focused on histo-morphological distribution of taste buds and mucous secreting cells. Literature pertaining to histochemically localization of mucopolysaccharides and some enzymes have been mostly confined to anterior part of GIT. In the later years, most of the studies were carried out on the anatomy and histology of GIT in relation to the feeding habits of the fishes. Some attention has also been paid to studies relating to localization of glycoconjugates while the studies on ultrastructural details of the various segments of GIT are limited and more studies are warranted including those on the presence of different types of lectins in various regions of alimentary canal.

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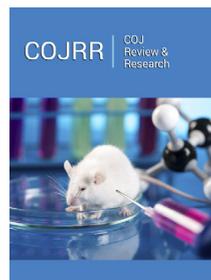
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