Histochemical Localization of Mucopolysaccharides in Skin of Freshwater Fishes: A Comparative Study

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Abstract:
Fish epidermal mucus provides the first line of defense against pathogens. The present work reports on the comparative study of variation in Structure of skin and defense markers among some of the fresh water fishes mrigal (*Cirrhinus mrigala*), grass carp (*Ctenopharyngodon idella*), bighead carp (*Aristicthys nobilis*) snake head (*Channa punctatus*), walking catfish (*Clarius batrachus*) and tilapia (*Oreochromis niloticus*) with respect to their role in innate immune system. The defense markers analyzed include Presence of Different types of mucopolysaccharides in skin. From the histochemical localization of the skin of diffrent species acidic mucopolysaccarides (GAG) and neutral mucopolysaccarides have been locallized, which play important role in the defense mechanisms

1. INTRODUCTION

Body surfaces of multicellular organisms are defended by epithelia, which provide a physical barrier between the internal milieu and the external world. Skin is the structure that covers the body and protects it not only from the entry of pathogens or allergens, but also from the leakage of water, solutes, or nutrients. These outside-in and inside-out barrier functions are dependent on the epidermis. While mucus covers the epidermis. Skin is unique and histologically diverse. It is very different from that of mammals, because it secretes mucus which is involved in immune functions. Glycosaminoglycans: (GAGs) are linear acidic polysaccharides found on cell surfaces and in the surrounding extracellular matrix. GAGs participate in and regulate many cellular events in physiological and pathophysiological processes, such as cell proliferation and differentiation, cell– cell and cell–matrix interactions, and viral infection, through their interaction with different proteins. GAGs are divided into four main categories—hyaluronic acid (HA), chondroitin sulfate/dermatan sulfate (CS/DS), heparosan/heparan sulfate/heparin (HN/HS/HP), and keratan sulfate—based on monosaccharide composition and the configuration and position of the glycosidic bonds between their monosaccharides (Zhang et al., 2008).GAG have a large ion- and waterbinding capacity, and play an important role in the maintenance of the viscosity of extracellular ground substances (Muir, 1980).the functional significance of GAG is protection against pathogenic organisms (Marshall, 1978; Hughes, 1980).

2. MATERIAL AND METHODS

Fish collection: *Hypophthalmicthys nobilis, cirrhina mrigala, ctenopharyngodon idella and tilapia* were obtaind from juhu-krupa farm, pij village, taluka nadiad (dist. Kheda). From there we are transport the fish in polythene bag with airated water and immediately collected the mucus.

Histochemical Localization of the Mucopolysaccrides by Alcine blue PAS Technique: Dissect out the fish skin and immediately transfer into nutral buffered formaline for 24 hours. The tissue were dehydrated with alcohol series and blocks were prepared in 60-6C paraffin wax.the section were cut at 10micro meter

and dewax the riboon and stained with alcine blue, periodic acid and schiff's reagent and Photographs were taken at 40X.

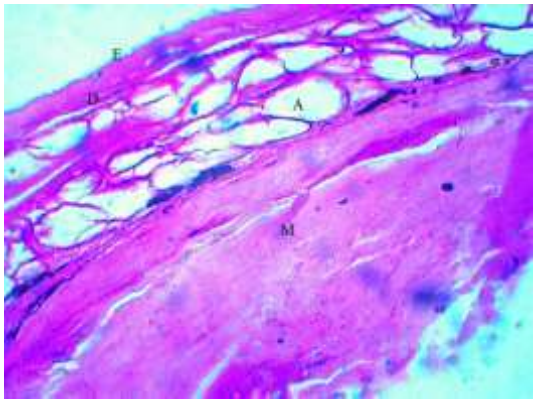
Histology analysis : Dissect out the fish skin and immediately transfer into Bouin's FIxative for 24 hours. The tissue were dehydrated with alcohol series and blocks were prepared in 60-6C paraffin wax.the section were cut at 10micro meter and dewax the riboon and stained with Hematoxylene-Eosine and Photographs were taken at 40X.

3. RESULTS AND DISCUSSION

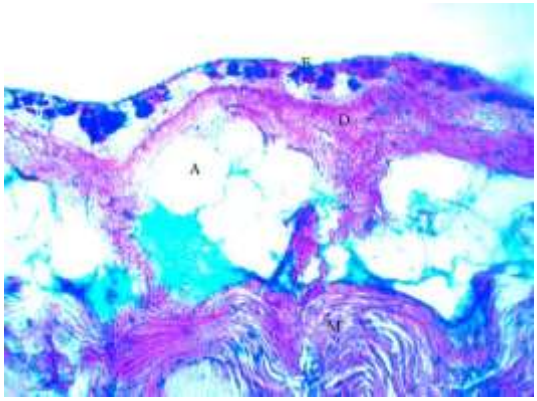
All section shows presence of GAGs are acidic polysaccharides found on cell surfaces and in the surrounding extracellular matrix.GAGs participate in and regulate many cellular events in physiological and pathophysiological processes, such as cell proliferation and differentiation, cell– cell and cell–matrix interactions, and viral infection, through their interaction with different proteins. GAG have a large ion- and waterbinding capacity, and play an important role in the maintenance of the viscosity of extracellular ground substances (Muir, 1980).the functional significance of GAG is protection against pathogenic organisms (Marshall, 1978; Hughes, 1980).

Histochemical Localization of Mucopolysaccrides in skin of freshwater fishes

***1. Channa Punctatus* (40X)**



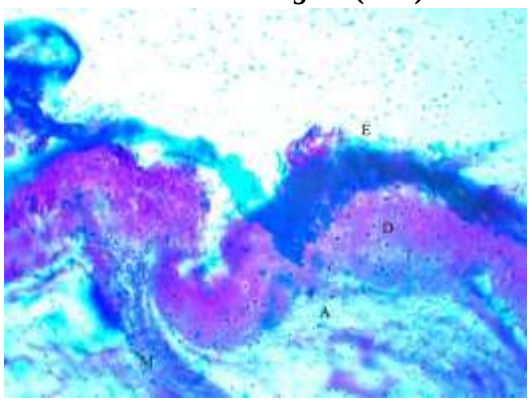
***2. Clarius batrachus* (40X)**



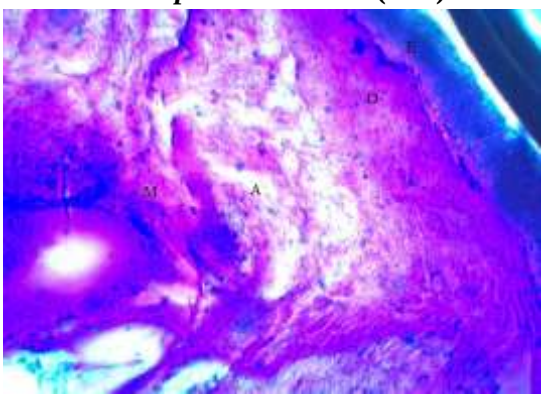
1. Photographs indicate clear presence of acidic mucopolysaccarides (blue or magenta color) in dermal region especially near adipose tissue. Neutral mucopolysaccarides also clearly seen in the section.
2. Photographs indicate clear presence of acidic mucopolysaccarides (blue or magenta color) in dermal region especially near adipose tissue and also in some portion of the muscular layer and neutral mucopolysaccarides also clearly seen in the section.
3. Photographs indicate clear presence of acidic mucopolysaccarides (blue or magenta color) in Epidermal and dermal region epecially near adipose tissue and also in some portion of the muscular layer and neutral mucopolysaccarides also clearly seen in the section

4. Photographs indicate clear presence of acidic mucopolysaccarides (blue or magenta color) in Epidermal and also in some portion of the muscular layer and neutral mucopolysaccarides also clearly seen in the section.

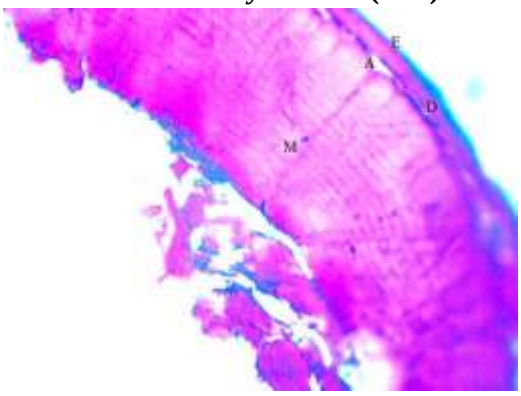
3. C*irrhina mrigala* (40X)



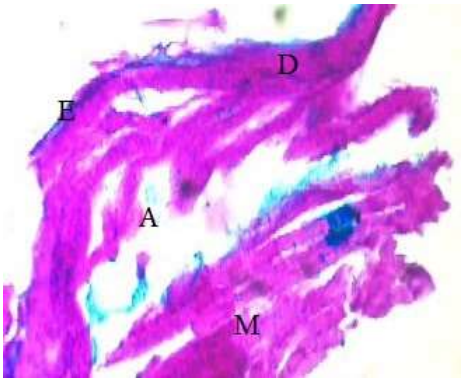
4. *Tilapia mossambica* (40X)



5. *Aristhichthys nobilis* (40X)



6. *Ctenopharyngodon idella* (40X)



5. Photographs indicate clear presence of acidic mucopolysaccarides (blue or magenta color) in Epidermal and dermal region especially near adipose tissue and also in some portion of the muscular layer and neutral mucopolysaccarides also clearly seen in the section.

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4. CONCLUSION

From the histochemical localization of the skin of diffrent species acidic mucopolysaccarides (GAG) and neutral mucopolysaccarides have been locallized, which play important role in the defense mechanisms. Thus, present work suggest that the primary defense system in terms of chemical and physical properties of mucus is rhobust in *channa punctatus* quite weaker in *Ctenopharyngodon idella.*

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