Short Communication

Antibacterial Activity of Lactic Acid Bacteria (LAB) Against Significant Fish Pathogens

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ABSTRACT

Fifty (50) Nile tilapia (Oreochromis niloticus) and 50 Common carp (Cyprinus carpio) were screened for lactic acid bacteria (LAB) using specific media. The antibacterial activity of LAB was estimated against pathogenic bacteria (Aeromonas cavie and Pseudomonas fluorescence). The results indicated that the recovered LAB isolates from intestine of Nile tilapia and Common carp were 13 (26%) and 4 (8%), respectively. The isolated species were Lactococcus lactis, Lactobacillus animalis, Lactobacillus plantarum, Lactobacillus fermentum and Lactobacillus raffinolactis recovered from Nile Tilapia intestine, whereas Lactococcus lactis, Lactobacillus animalis, Lactobacillus plantarum and Lactobacillus acidophilus were isolated from Common carp. LAB isolates had an antibacterial effect against Pseudomonas fluorescence and Aeromonas cavie.

Key words: Aeromonas, Antimicrobial activity, Fish, LAB, Pseudomonas

INTRODUCTION

Aquaculture has an important role in the development of many national economies and plays a key role in rural development. Aquaculture also plays an important role in meeting the increasing demand for aquatic animal production (Haylor and Bland, 2001). Disease out breaks is recognized as a significant constraint for aquaculture production and trade, affecting both the economic development and socioeconomic revenue of the sector in many countries (Walker and Subasinghe, 2000). It has been estimated that 10% of fish losses in aquaculture is due to disease and more than 50% of this is due to bacterial agents. According to many reports, lactic acid bacteria (LAB) are normal flora in gastrointestinal (GI) tract of healthy animals like mammals and aquaculture animals (Nikoskelainen et al., 2001). (LAB) are characterized as Gram - positive, usually non-motile, non spore forming bacteria that produce lactic acid as a major or a sole product of fermentative metabolism. (Kandler et al, 1986).

Physiological and biochemical characteristics of 84 strains isolated from intestines of beluga and Persian sturgeon revealed that these strains can be categorized into 2 metabolic groups; facultative and obligate hetero-fermentative. The most common presumptive lactobacilli species were Lactobacillus sakei and Lactobacillus plantarum. (Ghanbari et al., 2009). (LAB) are known microorganisms that have probiotic properties. They can produce inhibitory compounds such as lactic acid, hydrogen peroxide, diacetyl, acetaldehyde and bacteriocin. These compounds are able to inhibit the growth of harmful microorganisms (Ringo and Gatesoupe, 1998 and Gatesoupe, 1999). Lactobacilli are present in the intestines of various fish species at larval, fry and fingerling stages inhabiting ponds. They provide information on the changes in their composition as a function of the season of the year and life-stage of the fish. However, it was discussed that some human activities like artificial feeding in ponds would have had an effect on the bacterial composition and load in some fish, like carp (Cyprinus carpio) which showed the highest content of LAB in the intestines (Kvasnikov et al., 1977). Dietary administration of Lactobacillus spp. enhanced the growth, innate immune responses, and disease resistance of the grouper Epinephelus coioides (Son et al., 2009), Epinephelus bruneus and Nile tilapia (Oreochromis niloticus) (Ngamkala et al., 2010). Therefore, the antibacterial activity of some LAB isolated from fish was evaluated against some bacterial fish pathogens such as Aeromonas cavie and Pseudomonas fluorescence.

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The pathogenic bacteria used in this study (effect of LAB against some pathogenic bacteria in fish. 2013) with a minor modification to study the antibacterial effect of LAB in vitro (bioMerieux, France).

University for identification using API 50 CHL Microbiology, Faculty of Veterinary Medicine, Cairo were preserved and transported to the Department of the Department of Fish Diseases, Central Lab for Aquaculture Research in Abbassa. Briefly, disks of sterile filter paper were immersed in LAB culture (matches 0.5 MacFarland that equals 1.5 X 10^8cfu/ml). Suspensions of the Department of Fish Diseases, Central Lab for Aquaculture Research in Abbassa, Abu-Hammad, Sharkia Governorate, Egypt. Fishes were randomly collected from the production ponds of Central Lab for Aquaculture Research in Abbassa. Aquaculture Research in Abbassa. Briefly, disks of sterile filter paper were immersed in LAB culture (matches 0.5 MacFarland that equals 1.5 X 10^8cfu/ml). Suspensions of the Department of Fish Diseases, Central Lab for Aquaculture Research in Abbassa, Abu-Hammad, Sharkia Governorate, Egypt. Fishes were randomly collected from the production ponds of Central Lab for Aquaculture Research in Abbassa.

Isolation of lactic acid bacteria (LAB)

Under complete aseptic condition, samples from intestine, liver, kidney, spleen were inoculated in Tryptic Soy broth and incubated at 30°C for 24 hours (De Man et al., 1960). Then, all tubes were subcultured on MRS Agar (DIFCO™ lactobacilli) and incubated at 30°C for 48 hours (Ghanbari et al., 2009). Suspected colonies of LAB were preserved and transported to the Department of Microbiology, Faculty of Veterinary Medicine, Cairo University for identification using API 50 CHL (bioMerieux, France).

Antibacterial activity of LAB in vitro

Antibacterial activity of the isolated LAB was carried out using diffusion method (Gonsales et al., 2006; CLSI, 2013) with a minor modification to study the antibacterial effect of LAB against some pathogenic bacteria in fish. The pathogenic bacteria used in this study (Aeromonas cavie and Pseudomonas fluorescence) were locally isolated from Nile tilapia and preserved in the strain bank of the Department of Fish Diseases, Central Lab for Aquaculture Research in Abbassa. Briefly, disks of sterile filter paper were immersed in LAB culture (matches 0.5 MacFarland that equals 1.5 X 10^8cfu/ml). Suspensions of the Department of Fish Diseases, Central Lab for Aquaculture Research in Abbassa. Briefly, disks of sterile filter paper were immersed in LAB culture (matches 0.5 MacFarland that equals 1.5 X 10^8cfu/ml). Suspensions of the Department of Fish Diseases, Central Lab for Aquaculture Research in Abbassa. Briefly, disks of sterile filter paper were immersed in LAB culture (matches 0.5 MacFarland that equals 1.5 X 10^8cfu/ml). Suspensions of the Department of Fish Diseases, Central Lab for Aquaculture Research in Abbassa. Briefly, disks of sterile filter paper were immersed in LAB culture (matches 0.5 MacFarland that equals 1.5 X 10^8cfu/ml). Suspensions of the Department of Fish Diseases, Central Lab for Aquaculture Research in Abbassa.

RESULTS

Table 1 shows the prevalence of isolated LAB from freshwater fishes. The results indicated that the LAB isolates recovered from intestines of Nile tilapia and Common carp were 13 (26%) and 4 (8%), respectively. The recovered species were Lactococcus lactis, Lactobacillus animalis, L. plantarum, L. fermentum and L. raffinolactis isolated from Nile tilapia, while Lactococcus lactis, Lactobacillus animalis, L. plantarum and L. acidophilus from Common carp. The antibacterial effect of Lactobacillus isolates against Aeromonas cavie is less potent than that against Pseudomonas fluorescence as shown in Table 2.

DISCUSSION

LAB is those bacteria that ferment sugars getting 50% of lactic acid. Many trials were performed to evaluate LAB as a probiotic supplement in fish feed (Ayo-Olalusi et al., 2012). The antibacterial activity of Lactobacillus spp. strain RR17 was tested against Aeromonas spp., Vibrio spp., Escherichia coli, Pseudomonas spp. and Salmonella spp. isolated from O. mosambicus by using agar diffusion assay, it was found that Lactobacillus spp. strain RR17 had antagonistic activity against some pathogenic bacterial species (Aly et al., 2008; Kim and Austin, 2008; Lara-Flores, 2011). The authors also have demonstrated the positive effects of LAB on the general status of various species of fish. Our results supported the same theory, the percentage of the recovered Lactobacillus isolates from intestines of Nile tilapia and Common carp were (26%) and (8%), respectively, and they had an antibacterial effect against Aeromonas cavie and Pseudomonas fluorescence. It may be owed to the production of bacteriocin which inhibits the growth of Gram-positive and Gram-negative bacteria (Bernet et al., 1994; Servin, 2004; Lash et al., 2005). Bacteriocins are proteinaceous toxins produced by bacteria that have antibacterial effect. They are typically considered to be narrow spectrum antibiotics, though this has been debated. They are phenomenologically analogous to yeast and paramecium killing factors, and are structurally, functionally, and ecologically diverse (Farkas-Himsley, 1980). Another explanation is supporting such positive effect, the LAB are significantly reducing the adhesion of some pathogenic bacteria such as Aeromonas hydrophila, Aeromonas salmonicida, Vibrio anguillarum and Yersinia.
fish (Balcázar et al., 2008; Denev et al., 2009).}

**Conclusion**

From the present study, it was concluded that LAB as probiotics improve and support good health for host by protection against infections by secretion antibacterial substances against fish pathogens, so it can improve weight gain and feed conversion ratio.

**REFERENCES**


Ghanbari M, M Rezaei, M Jami and RM Nazari, 2009. Isolation and characterization of Lactobacillus species from intestinal contents of beluga (Husohuso) and Persian sturgeon (Acipenserpersicus), Iranian Journal of Veterinary Research, Shiraz University. 10: 27.


Son VM, CC Chang, MC Wu, YK Guu, CH Chiu and WT Cheng, 2009. Dietary administration of the probiotic, Lactobacillus plantarum, enhanced the growth, innate immune responses, and disease resistance of the grouper Epinepheluscoioides. Fish Shellfish Immunol, 26: 691-698