

Battle between Antibiotics and Pathogenic Bacteria, Steady Development of Resistance towards Antibiotics and Antibiotics in Indian Shrimp Farming [†]

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Abstract: Pathogenic bacteria exhibit social behavior in the human body system, and exhibit an amazing way of survival, overcoming the effects of bactericidal and bacteriostatic antibiotics. Some bacteria, once sensitive, have now become resistant to almost all easily available antibiotics; these bacteria are able to cause serious diseases and are a major human health concern. It was thought that against Vancomycin, antibiotic resistance would never develop, but in reality, resistance developed within 30 years of its deployment. Antibiotics, as small molecules, target and binds to a much larger molecule like enzymes and often to 70s or 30s ribosomal subunits of infection-causing bacteria, tightly fit into a pocket and blocks their functional machinery. Bacteria can no longer cause harm. Antibiotics usually obstruct the formation of the bacterium’s cell wall or cell organelles or stop bacteria from multiplying. On the other hand, bacteria can make enzymes that cleave the structure of antibiotics, and the products of breakdown can no more fit into that pocket, and the activity of bacteria remains unprevented. Efflux pumps present over the cell membrane of bacteria can pump out antibiotics before they can work, thus facilitating antibiotic resistance. If people in developing and under-developed countries do not buy a whole course of antibiotics during illness and do not consult physicians, it will lead to a spread of antibiotic resistance. Once antibiotics like Streptomycin meant for tuberculosis had proved very effective, which could cure the disease, but again, after twenty years, the disease had been found to relapse, and Latent Dormant Persistent Bacteria that causes TB exhibited pathogenicity. With a change in the basic arrangement of nucleotides in DNA, *i.e.*, mutation, bacteria have become resistant to certain antibiotics. In finfish and shrimp farming in India, Tetracycline and Trimethoprim can be used. Twenty antibiotics and pharmacologically active substances are banned by MPEDA (Govt. of India) for use in commercial pond aquaculture. The residue of banned antibiotics, if found to remain in farmed and subsequently processed marketable-sized shrimps *Penaeus monodon* and *Litopenaeus vannamei* and detected in EU or other importing countries, will lead to refusal and rejection of the import consignment; that will leave a bad image on Indian product. Presently about 30% of Indian export consignment of processed shrimp is rejected by importers, which is unfortunate and disadvantageous for the raw material producers, *i.e.*, shrimp farmers in coastal states of India who supply the same to exporters. In 2016-2017, out of 80 shrimp consignments rejected in India, 24 were specified for antibiotic contamination. Presently antibiotics are very cautiously used in finfish and shrimp farms; it has been drastically minimized with the introduction of probiotics used with fish/shrimp supplementary feed and in a pond environment.

Keywords: antibiotics; probiotics; shrimp farming.

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Conflicts of Interest

The authors declare no conflict of interest.