

James et al. (2008) reported that vitamin E has a considerable impact on the eating, growth, reproduction, and leukocyte count of *C. auratus*. Furthermore, they noted that fish fed a diet containing 300 mg of vitamin E per kg exhibited superior growth, gonad weight, gonadosomatic index, egg production, egg size, and hatching rate. Mehrad et al. (2012) found a notable disparity in body weight increase among zebrafish that were fed with a supplemental diet containing 500 and 1000 mg/kg of vitamin E, in comparison with the other groups. Additionally, the fish that were fed with a diet containing 1000 mg/kg of vitamin E exhibited the highest BWG. According to Wassef et al. (2001) the inclusion of vitamin E in the diet of aquatic organisms inhibits the oxidative degradation of unsaturated fatty acids in their diets and tissues. This assists in maintaining a typical metabolism and leads to increased survival rate, weight gain, and feed efficiency in these animals. Furthermore, He et al. (2017) found that vitamin E had a substantial impact on the development of the gut in fish. It was achieved by strengthening the structure of the intestinal wrinkles and increasing the thickness of the mucosal membrane. Since, the digestive and absorptive abilities of fish were enhanced, leading to improved growth. The findings of this study demonstrate that incorporating vitamin E into the diet is crucial for enhancing the survival rate and promoting the growth of *Catla catla*.

Chitin is the second most commonly found polysaccharide, following cellulose, and it makes up a significant portion of the exoskeleton structure of crustaceans (Boric et al., 2020). Chitin and its derived compounds possess several applications attributed to their biocompatibility (Barikani et al., 2014), biodegradability (Zhu et al., 2019), antibacterial and antioxidative characteristics (Ahmad et al., 2020). Danulat (1987) reported that the gastrointestinal system of *Gadus morhua* can digest up to 90% of chitin. Additionally, it has chitinase activity throughout its gastrointestinal system. In addition, Fines and Holt (2010) discovered that young *Rachycentron canadum* possess chitinolytic activity in their gastrointestinal system.

In this study, the addition of chitin to the diet over a period of 30 days leads to an increase in overall body weight. These outcomes are clearly evident as Kono et al. (1987) found that adding chitin to the diet of different kinds of fish such as yellowtail, sea bream, and Japanese eel, resulted in an increased growth rate and improved feed effectiveness. Shiau and Yu (1999) reported that the growth performance and digestibility of diet ingredients in hybrid tilapia fingerlings decrease as the amount of additional chitin in their diet increases. Elserafy et al. (2021) observed that the addition of chitin to the base diet of Nile tilapia at concentrations of 2 and 5% did not exhibit a significant improvement in growth performance when compared to the control group.

Chitosan is a biopolymer composed of glucosamine and N-acetylglucosamine that is obtained from the chitin found in the exoskeletons of crustaceans like crabs, lobsters, prawns, and krill, as well as the cell walls of fungi (El-Naggar et al., 2021). The addition of chitosan has a beneficial impact on the growth of fish, and additionally, on the structure and function of the intestines and the process of nutrient digestion and absorption. Abdel-Ghany and Salem (2019) and Maqsood et al. (2010) found that adding 2% chitosan to the diet of common carp can decrease fish mortality and improve their ability to grow.

Similarly, Salam et al. (2021) found that the chitosan supplemented feed at a dose of 1 g/kg increased body weight gain at days 15, 30, 45, and 60 after the treatment in juvenile *Barbonymus gonionotus*. Zaki et al. (2015) observed that the mean percentage of feed body weight and specific growth rate per day were significantly greater in the three groups of *Dicentrarchus labrax* that received a diet supplemented with 1 g chitosan per kg diet. The findings of Zhao et al. (2022) have substantiated that chitosan has the ability to inhibit the digestion of Dp-Ca (peptide-calcium chelate) in the stomach. This, in turn, leads to an increased amount of calcium being introduced into the intestine, thereby facilitating the absorption of calcium.

Levamisole, a synthetic compound belonging to the phenylimidazolthiazole class, is currently widely employed in human as well as animal medicine as an antihelminthic drug (Janssen, 1976). Levamisole was originally used in fish to augment the innate immune response (Baba et al., 1993) and used as an adjuvant in combination with a vaccine (Jeney and Anderson, 1993). Maqsood et al. (2009) found that adding 250 mg of levamisole per kg of feed