

The impact of climate change on Omega-3 long-chain polyunsaturated fatty acids in bivalves

ABSTRACT

Omega-3 long-chain polyunsaturated fatty acids (n-3 lc-PUFA) have many health benefits to human. increasing evidence have shown that climate change reduces the availability of plankton n-3 lc-PUFA to primary consumers which potentially reduces the availability of n-3 lc-PUFA to human. Since marine bivalves are an important source of n-3 lc-PUFA for human beings, and bivalve aquaculture completely depends on phytoplankton in ambient water as food, it is important to understand the impact of climate change on the lipid nutritional quality of bivalves. in this study, fatty acid profile of different bivalves (mussels, oysters, clams, scallops and cockles) from different regions (tropical, subtropical and temperate) and time (before 1990, 1991–1995, 1996–2000, 2001–2005, 2006–2010, 2011–2015, 2016–2020) were extracted from published literature to calculate various lipid nutritional quality indicators. the results of this study revealed that the effects of global warming and declines in aragonite saturation state on the lipid content and lipid indices of bivalves are highly dependent on the geographical region and bivalves. in general, global warming has the largest negative impact on the lipid content and indices of temperate bivalves, including decreasing the PUFA/SFA, ePA + DHA and n-3/n-6. However, global warming has a much smaller negative impact on lipid content and lipid indices in other regions. the declines of aragonite saturation state in seawater promotes the accumulation of lipid content in tropical and subtropical bivalves, but it compromised the PUFA/SFA, ePA + DHA and n-3/n-6 of bivalves in all regions. the findings of this study not only fill the knowledge gap of the impact of climate change on the lipid nutritional quality of bivalves, but also provide guidance for the establishment of bivalve aquaculture and fisheries management plans to mitigate the impact of climate change.