The use of supercritical carbon dioxide (scCO\textsubscript{2}) has increased in importance as an innovative preservation method particularly due to the bactericidal effect of scCO\textsubscript{2}. Additionally, it causes minimal alterations in the sensorial characteristics of the product. This work aims at evaluating the effects of scCO\textsubscript{2} on the total count, \textit{Vibrio} sp and \textit{Vibrio parahaemolyticus} in fresh oysters. They were exposed to scCO\textsubscript{2} during two hours, at 33\textdegree{}C, submitted to pressures from 80 bar up to 200 bar, considering a pressurization and depressurization rate of 100 bar/min. Under these conditions, two different mass ratios of scCO\textsubscript{2} to oyster sample were tested: 1:0.2 and 1:0.8. Results showed a decrease in the total microbial load in both treatments. On one hand, when it was used a higher amount of scCO\textsubscript{2} (1:0.8) the \textit{Vibrio} sp. and \textit{Vibrio parahaemolyticus} were totally eliminated, which were initially counted as $9.5 \times 10^4$ and $8.5 \times 10^4$ UFC.mL\textsuperscript{-1}, respectively. In addition, there was a reduction of 94\% of the total count ($1.6 \times 10^4$ UFC.mL\textsuperscript{-1}) in the oysters. On the other hand, at 0.2 ratio the elimination was 94\% and 78\% of \textit{Vibrio} sp. and \textit{Vibrio parahaemolyticus}, respectively. As a result, for the conditions analyzed in this work the most efficient one was at 1:0.8 (scCO\textsubscript{2}/product mass ratio). Moreover, we were able to confirm the scCO\textsubscript{2} capabilities in reducing the microbial load in oysters, which enhance the product’s safety and it has the potential of increasing shelf life.