In this study, to observe the behavior of chemical anchors embedded in concrete under the tensile effect,108 different anchor specimens were prepared with different parameters as concrete compressivestrength, reinforcement bar diameters, anchor depths, sizes of drilled holes, cleanliness of the drilledholes. Pull-out tests were conducted and obtained data were examined with the axial-load capacitiesand the failure situations. Finally, the depth of anchors, compressive strength and reinforcement diame-ter were observed to increase the axial-load-bearing capacity. The specimens cleaned with water couldbear more axial loads than cleaned using air. For the anchors installed without cleaning the holes, a sig-nificant decrease was observed in the axial-load carrying capacities compared to the other two condi-tions. The ANN algorithm exhibited a 78.3% prediction success compared with other algorithms. Theempirical relations in the literature were found to have limited level of prediction success rates accordingto the ANN's results