We consider orthogonal polynomials corresponding to a \( q \)-integral on \( \mathbb{R} \). The \( q \)-integral can be written as a sum of two bilateral \( q \)-hypergeometric \( 2\psi_2 \)-series, for which an evaluation formula is known due to Slater. The corresponding orthogonal polynomials, which are (limit cases of) big \( q \)-Jacobi polynomials, do not form a basis for the corresponding \( L^2 \)-spaces. A set of functions that complements the orthogonal polynomials to an orthogonal basis can be obtained using spectral analysis of \( q \)-difference operators. These polynomials and their complementing function arise naturally in representation theory of quantum groups. (Received September 14, 2015)