In this talk, we will treat the following classical problem:

“Determine all possible orthogonal polynomials generated by Brenke type generating functions,

\[ \psi(t, x) := B(t)h(tx) = \sum_{n=0}^{\infty} h_n P_n(x) t^n, \]

where functions \( h(x) \) and \( B(t) \) are analytic around the origin,

\[ h(x) = \sum_{n=0}^{\infty} h_n x^n, \quad B(t) = \sum_{n=0}^{\infty} b_n t^n \]

with \( h_n \neq 0 \) for \( n \geq 0 \) and \( h(0) = B(0) = 1 \) just for normalizations”. Chihara ('68 '71) classified them essentially into four classes I–IV. However, explicit expressions of \( \psi(t, x) \) for each class, that is, \( B(t) \) and \( h(t) \), were not obtained in his papers. Moreover, the associated Jacobi-Szegö parameters for Class IV were not given although several examples were mentioned briefly by a very vague explanation. In this talk, we will report that \( B(t) \) and \( h(t) \) for each class can be expressed by \( q \)-hypergeometric series and the Jacobi-Szegö parameters for Class IV coincide with those of discrete \( q \)-Hermite polynomials. The present results are based on the joint work with I.Kubo (Hiroshima, Japan) and H.-H. Kuo (LSU). (Received September 19, 2011)