Let $q = 1, p = 0$ and $T_{pq}^{n} : \begin{cases} a_n = b_{n-1}q + a_{n-1}q + a_{n-1}p \\ b_n = b_{n-1}p + a_{n-1}q \end{cases}$

$\Rightarrow T_{pq}^{n+1} : \begin{cases} a_{n+1} = b_{n-1}(2pq + q^2) + a_{n-1}(q^2 + 2pq) + a_{n-1}(p^2 + q^2) \\ b_{n+1} = b_{n-1}(p^2 + q^2) + a_{n-1}(2pq + q^2) \end{cases}$

Let $q' = 2pq + q^2$ and $p' = p^2 + q^2$

$\Rightarrow T_{pq}^{n} = (T_{p'q'}^{\frac{n}{2}})$