Let $K$ be a complete and algebraically closed non-archimedean field, and let $f \in K(z)$ be a rational function of degree $d \geq 2$. The map $f$ is said to be hyperbolic if there is some metric on its Julia set with respect to which it is expanding. We prove that if $f$ is hyperbolic, then a certain stability property of its Julia set holds in some neighborhood of $f$ in the moduli space $M_d$. (Received September 10, 2020)