We apply *hp*-cloud method to the radial Dirac eigenvalue problem. The difficulty of occurrence of spurious eigenvalues among the genuine ones in the computation is resolved. The method of treatment is based on assuming *hp*-cloud Petrov-Galerkin scheme to construct the weak formulation of the problem which adds a consistent diffusivity to the variational formulation. The size of the artificially added diffusion term is controlled by a stability parameter ($\tau$). The derivation of $\tau$ assumes the limit behavior of the eigenvalues at infinity. The parameter $\tau$ is applicable for generic basis functions. This is combined with the choice of appropriate intrinsic enrichments in the construction of the cloud shape functions.