abstract We systematically analyze the recent claim that nonrelativistic and relativistic mean field (RMF) based random phase approximation (RPA) calculations for the centroid energy $E_0$ of the isoscalar giant monopole resonance yield for the nuclear matter incompressibility coefficient, $K_{nm}$, values which differ by about 20%. For an appropriate comparison with the RMF based RPA calculations, we obtain the parameters of the Skyrme force used in the nonrelativistic model by adopting the same procedure as employed in the determination of the NL3 parameter set of the effective Lagrangian used in the RMF model. Our investigation suggests that the discrepancy between the values of $K_{nm}$ predicted by the relativistic and nonrelativistic models is significantly less than 20%.