Since Albert Szent-Gyorgyi’s Nobel Prize winning research in 1937, synthetic and natural flavonoids have been extensively studied by researchers around the world. Quercetin (3,3',4',5-7-pentahydroxyflavone), and Morin (3,2',4',5-7-pentahydroxyflavone), are ubiquitous in plants of higher genera, and are widely studied for their high therapeutic potency and low systemic toxicity to treat a wide spectrum of diseases which include cancers, neurodegenerative disorders, and atherosclerosis. Here, an exploratory study on morin has been performed in protein (human serum albumin (HSA)) microenvironment. Our previous studies have revealed that quercetin binds in the interdomain cleft region of serum albumin protein. However, the behavior of morin in protein environment is not studied yet. Usually flavonols with a 5-OH group show fluorescence emission only when they are bound with a rigid environment. Absorption, fluorescence, and circular dichroism (CD) spectroscopic measurements have been carried out at five different temperatures, 15, 20, 25, 30 and 37 °C to observe the influence of the structure of protein on the binding with morin. The dual fluorescence characteristics (excited state proton transfer, ESPT) of morin decreased with increasing temperature. Studies of morin with HSA at multiple temperatures indicated that structure of the protein influences the thermodynamics of the binding process. The novel use of plant flavonoids as their own reporters, exploiting their intrinsic fluorescence properties, for probing their interactions with relevant targets is further exemplified in this study.