Phleboviruses transmitted by phlebotomine sandflies are endemic in the Mediterranean basin. Toscana phlebovirus (TOSV), Sicilian phlebovirus (SFSV), and Naples phlebovirus (SFNV) are responsible of summer fever, with well-known pathogenic potential for humans ranging from asymptomatic to mild fever, in addition to neuro-invasive infections during summer. Although TOSV, in particular, is a significant and well-known human pathogen, SFVs remain neglected, with many gaps in the relevant knowledge. Sero-epidemiological studies and case reports recently showed a geographical wider distribution than previously considered, although the real incidence of phleboviruses infections in the Mediterranean area is still unknown. Here we retrospectively evaluated the circulation of phleboviruses during summer seasons between 2007 and 2019 in 649 patients showing neurological symptoms using both molecular and serological approaches. We found that 42/649 (6.5%) subjects experienced phlebovirus infection and only 10/42 cases were detected by molecular assays, whereas the other 32/42 were identified using serological approaches, including neutralization assays. During the 2013 summer, an outbreak in the Lombardy region is described because the prevalence of phlebovirus infection reached 37.2% (19/51 subjects). Interestingly, only 5/19 (26.5%) reported traveling in endemic areas. Of note, no cross-neutralization was observed between different strains tested, showing the possibility to be reinfected by newly discovered phlebovirus strains. In conclusion, phlebovirus infections are still inadequately considered by physicians and are generally underestimated. However, based on our results, sandfly fever viruses should be routinely included in diagnostic panels during summer period, including in Northern Italy