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Research highlights

► Mayaro virus induces increase in reactive oxygen species and in antioxidant defences
► Mayaro virus infection triggers oxidative stress cellular response
► Oxidative stress may be an important factor in the Mayaro virus pathogenesis

Abstract

Mayaro virus (MAYV) is a neglected tropical arbovirus that causes a febrile syndrome that is sometimes accompanied by incapacitating arthritis/arthralgia. The pathogenesis of MAYV has not been completely defined and oxidative stress mediated by an increase in reactive oxygen species (ROS) and/or depletion of antioxidant defences has been found to contribute to several aspects of viral disease. To investigate whether MAYV induced oxidative stress in host cells, we monitored ROS production, oxidative stress markers and antioxidant defences at different time points after infection. Our results show that MAYV induced significant oxidative stress in infected HepG2 cells, as indicated by the increase of malondialdehyde (MDA) and protein carbonyl levels, and by a significant decrease of the reduced versus oxidized glutathione (GSH/GSSG) ratio. Generally, MAYV-infected HepG2 cells also showed an increase in antioxidant defences. We observed an increase in the superoxide dismutase (SOD) and catalase (CAT) activities and the total glutathione content. To determine whether similar effects occurred in other cell types, we evaluated the ROS, MDA and SOD activity levels in J774 cells after MAYV infection. Similar to our observations in HepG2 cells, the J774 cells showed an increase in ROS, MDA and total SOD activity following MAYV infection. Thus, since the cellular redox environment is influenced by the production and removal of ROS, we hypothesize that the overproduction of ROS was responsible for the oxidative stress in response to the MAYV infection despite the increase in the