Evaluation of antiviral activity of Manuka honey against SARS-CoV-2

Israa ElBashir1,2, Aisha Nasser J M Al-Sae1, Paul J Thornalley2 and Naila Rabbani3

1 Qatar University Biomedical Research Centre QU-NRC, QU Health, Qatar University; 2 Diabetes Research Centre, Qatar Biomedical Research Institute (QBRI), Hamad Bin Khalifa University, Qatar Foundation; and 3 College of Medicine, QU Health, Qatar University

INTRODUCTION
Severe acute respiratory syndrome coronavirus (SARS-CoV-2) has been documented in Wuhan city in China during the end of the year 2019. On 11 March 2020 the World Health Organization (WHO) announced COVID-19 as a pandemic. COVID-19 has a variety of indications from asymptomatic infection to normal cold and flu or severe pneumonia or death. Hence, boosting of the immune system is crucial to ease the complication coupled with it. Natural immunity boosters, such as honey, have been utilized by humans for centuries. An in silico study showed the latent possibility of Manuka honey capability in inhibiting SARS-CoV-2 proteases (Hashem, 2020). Manuka honey contains high concentrations of methylglyoxal (MG) that can inhibit SARS-CoV-2 proteases (Degen et al., 2013), likely due to metabolism by intestinal bacteria. MG content in fresh Manuka honey ranges between 50 - 250 mg/kg, while in commercial Manuka honey it varies between 70 – 700 mg/kg (Atrott et al., 2012). Degan et al. calculated the daily quantity of MG intake between 5 – 20 mg/day (0.1 – 0.3 mmol/day) where Rabbani et al. (2016) estimated this value was lower, <0.03 mmol MG/day. Endogenous formation of MG in healthy human adults subjects is ca. 3 mmol per day (Rabbani et al. 2016). The MG content of Manuka honey is unlikely to be hazardous to health and be readily metabolized. Manuka honey may have antiviral activity against SARS-CoV-2 linked to its MG content. The study aim to characterize this by incubating SARS-CoV-2 with Manuka honey in cell-free medium before exposing it to Vero cells and assessing viral infectivity and growth at multiplicity of infection (MOI) of 0.1.

METHODOLOGY

RESULTS

DISCUSSION
Antiviral activity of Manuka honey against SARS-CoV-2 was detected for the first time in vitro. The virus titer was inhibited by 100% with MOI 0.1 when treated with ≥125 µM MG equivalents of commercial 250+ grade Manuka honey. The inhibition of the virus was microscopically viewed for the presence or absence of cytopathicity in quadruplicate wells. Virus titer (TCID50) determination further confirmed the efficacy of inhibiting SARS-CoV-2 MOI 0.1 replicated in Vero cells (Figure 2). Prior incubation of diluted Manuka honey with the MG scavenger, aminoguanidine (AG), abolished the antiviral effect. This suggests that MG content of Manuka honey may be the active component producing the antiviral activity.

REFERENCES


ACKNOWLEDGMENTS

We thank Qatar Foundation and Qatar University for funding for this research. This research was funded by QU grants: QUHI-CMED-21/22-1