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Fluctuations of airborne bacterial community in November 2019 haze event, Kandy Sri Lanka

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Human activities lead to deterioration of air quality and climate adversities. Haze events occurred in November 2019, in New Delhi, India and simultaneously misty air conditions were observed in many parts of Sri Lanka. Airborne bacteriology during this event had to be explored. Air samples were collected in Kandy, Sri Lanka during haze days (06/11/2019-09/11/2019) and on a non-haze day (14/11/2019) using three methods; natural sedimentation method (NSM)─(12h, Whatman 5), PM2.5 fine particulate air sampler (FPAS)─(1m3/hr,30 min) and a laboratory designed air sample collector (ASC)─(Whatman 5,50 ml/round). Collected bacteria on filter papers were extracted into sterile Milli-Q water and DNA was extracted using Boom`s method followed by real-time PCR. Bacterial load (cells/µl) was quantified with comparison to a standard curve generated by *Escherichia coli* DNA. Isolated bacterial cultures were identified using Sanger sequencing by amplifying 16S rRNA gene.

As per NSM, during day time, highest bacterial load was observed on 07/11/2019-an intense hazy day (1.89x106) followed by 08/11/2019 a moderately hazy day (2.79 x105). During night time, highest bacterial load was observed on 06/11/2019-most intense hazy day (5.83x105) followed by 07/11/2019 (5.18 x105) and 08/11/2019 (3.5x105). A similar trend was observed with the other two methods. Accordingly, the bacterial load gradually decreased with the decline of haze intensity. Also, compared to the control of each method (NSM; 1.12x105, FPAS; 1x105, ASC; 2.2x105), the haze days showed a high bacterial load. *Exiguobacterium acetylicum, Burkholderia multivorans, Bacillus megatarium, Phytobacter diazotrophicus, Pantoea deleyi, Acinetobacter modestus, Chryseobacterium gleum, B. paramycoides* were identified from air collected during haze days and *B. cereus, Ochrobactrum intermedium, P. wallisii* were observed regardless of haze.

Fluctuations of airborne microbial composition and presence/absence of certain bacteria could be used as important monitoring tools of air quality and pathogenicity of bacterial isolates needs to be explored further to identify potential hazards.

Keywords: haze event, airborne bacteria, bacterial load, air quality monitoring