Age, source of and future risk of infection in two settings of Hong Kong and Singapore by March 5, 2020

Shuying Zhu  
University of Hong Kong

Jun Tao  
University of Hong Kong

Huizhi Gao  
University of Hong Kong

Daihai He (✉ daihai.he@polyu.edu.hk)  
Hong Kong Polytechnic University  https://orcid.org/0000-0003-3253-654X

Research note

Keywords: COVID-19, age structure, Hong Kong, Singapore

DOI: https://doi.org/10.21203/rs.3.rs-17782/v2

License: ☛ ☀ This work is licensed under a Creative Commons Attribution 4.0 International License.  Read Full License
**Abstract**

Objective To compare the age, source of and future risk of infection in Hong Kong SAR China and Singapore by March 5, 2020. Results We find significant difference in age patterns of confirmed cases in these two localities and highlight the potential importance of population age structure in confirmed cases, which should be considered in evaluation of the effectiveness of control effort in different localities.

**Introduction**

The coronavirus disease 2019 (COVID-19) pandemic first broke out in Wuhan, China in December 2019, and was declared as a global pandemic by the World Health Organization (WHO) on 11 March 2020 [1]. As of 15 June 2020, more than 7,000,000 confirmed cases and approximately 5.5% mortality were identified worldwide [2]. The control experience in China showed that the isolation of infected persons, the tracking and quarantine of susceptible individuals, and other social distancing measures could contain this epidemic [3]. Singapore and Hong Kong are both praised as having taken “very effective” measures to intervene in the transmission of new coronavirus by a WHO official [4]. By March 5, there were 112 cases in Singapore and 106 cases in Hong Kong. It seemed that there was no significant difference in these two numbers given the fact that the measures adopted by Singapore were not as strict as those adopted by Hong Kong but both cities were at high importation risk due to the high proportion of mainland Chinese population flow. Therefore, some media held the view that Singapore adopted a plausibly proper but very effective strategy. In order to scientifically investigate the difference in the effectiveness of Singapore and Hong Kong, we performed several statistical tests of the new coronavirus cases of Singapore and Hong Kong in regard to their age distributions by March 5. We found that the situation in Singapore by March 5 might attribute to the relatively large proportion of young generations in its population and there is no significant difference between the effectiveness of the measures adopted by Hong Kong and Singapore government by March 5.

**Methods**

We obtained the data of the COVID-19 cases of Singapore and Hong Kong from Singapore and Hong Kong’s governmental websites [5, 6]. The imported cases and local cases of both districts were studied separately. And we obtained the age structure data of Hong Kong and Singapore separately from public websites by March 5. In order to compare the difference of age distributions of the two infected population and the effects of age structure. We performed the Wilcoxon rank-sum test to compare the age distributions of the infected patients in Hong Kong with those in Singapore. And then we divided age into age groups, and we counted the number of cases in each age group. We then used the Wilcoxon rank-sum test to compare the difference of age-specific incidence between the two populations. Lastly,
we obtained the age-specific incidence rate by dividing the number of cases in each age group by the population of that group and then compared the age-specific incidence rate by the Chi-square test.

Results And Discussion

From the onset of COVID-19 to March 5, there have been 23 imported cases in Singapore and Hong Kong, respectively. The age distribution of imported and local cases can be seen in Table S1 and Figure S1, which was similar to an epidemiological analysis using outsourced data in Mainland China [7]. Considering that Hong Kong has a total population of 7.45 million and is more geographically close to Mainland China, the risk of importing COVID-19 cases should be higher than Singapore which has a total population of 5.64 million and less pressure of population mobility with Mainland China. Results by Wilcox test reported a significant difference in age patterns of both imported cases and local cases between the two places, with Hong Kong taking up a higher percentage of elderly cases. Nevertheless, this difference is no longer significant after the standardization of imported and local case numbers by each age category in Hong Kong and Singapore respectively, shown in Table 1 and Figure 1. Therefore, it is reasonable to assume that the variation in age distribution of the cases might arise from the age structure of the population per se. Appropriate travel restrictions may delay the introduction of COVID-19 infection. Health authorities can provide advice or warnings to travelers. The formulation of the policy must weigh the potential serious economic consequences and the effect of the pandemic control.

Conclusion

Since the elderly are more vulnerable to get infected after exposure and develop into severe cases, thus the population age structure, among other factors, should be considered when comparing the effectiveness of control measure in different localities.

Limitations

The situations of COVID-19 change fast worldwide. The COVID-19 data of Singapore with age information has been unavailable for public after we first submitted this work. Hence, our work performed on merely the data of Singapore and Hong Kong by March 5. Although the patterns of infected cases may stay similar to some extent, the age structures of infected cases in both locations may be different now.

Abbreviations

- COVID-19: coronavirus disease 2019
- WHO: World Health Organization

Declarations
Ethics approval and consent to participate

The ethical approval or individual consent was not applicable.

Availability of data and materials

All data and materials used in this work were publicly available.

Consent for publication

Not applicable.

Funding

DH was supported by General Research Fund (15205119) of Research Grants Council of Hong Kong and an Alibaba-Hong Kong Polytechnic University Collaborative Research project.

Disclaimer

The funding agencies had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication.

Acknowledgements

None.

Consent for publication

Competing Interests

DH was supported by an Alibaba-Hong Kong Polytechnic University Collaborative Research project. Other authors declare no competing interests.

Authors' Contributions

All authors conceived the study, carried out the analysis, discussed the results, drafted the first manuscript, critically read and revised the manuscript, and gave final approval for publication.
References


Figures
**Figure 1**

Standardized incidence rate of the four groups

**Supplementary Files**

This is a list of supplementary files associated with this preprint. Click to download.

- AppendixTableandFigureofrawdata.docx
- Supplementarymaterial.docx