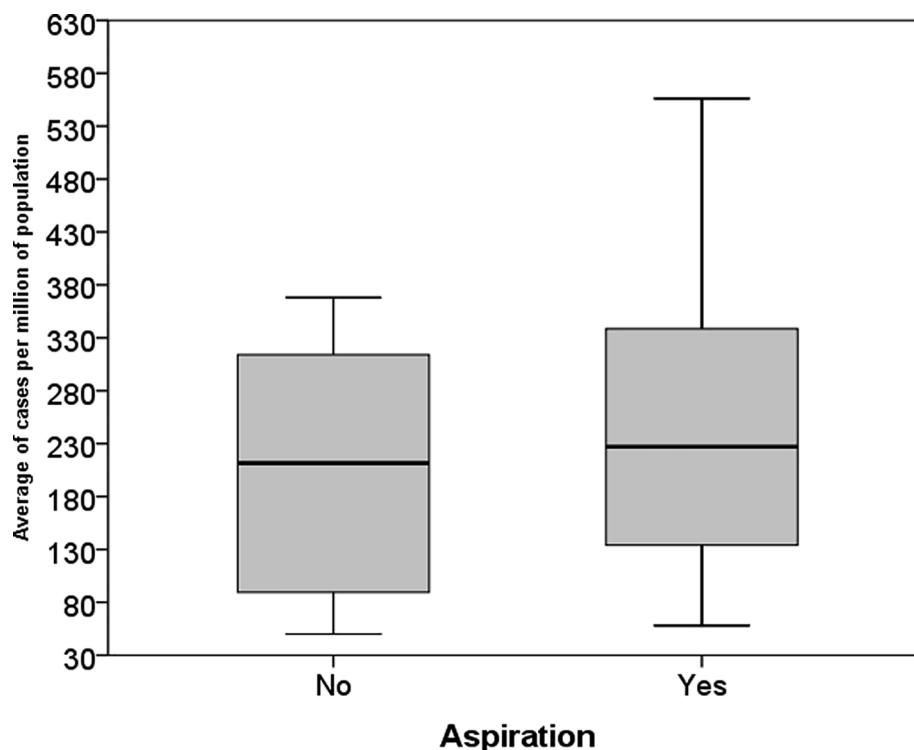


The use of aspirated consonants during speech may increase the transmission of COVID-19

Introduction

COVID-19 is transmitted through sneezing and coughing, which constitute its basic symptoms, due to the high velocity of droplets produced by these activities; however, recent studies have demonstrated that a large quantity of droplets may be produced even by talking or breathing [2,3]. Studies with respect to the effect of phoneme type (the main sound unit of speech) on the production of droplets are only few in number. For example [1], argued that SARS, which could be transmitted through droplets, did not infect one to three millions of Japanese who travelled to China in 2000, while American visitors in

In this paper, we support the hypothesis reported in Inouye [1] that aspirated consonants might produce more droplets in comparison to unaspirated consonants. To check this hypothesis, we have taken the 26 countries mostly infected (more than 1000 cases) by the COVID-19 as of 23rd of March. We excluded Switzerland since there are many official languages in its territory. Also, we excluded outliers, that is, countries with many cases (e.g., Italy) or very few cases (e.g., Japan) per million of population. The independent *t*-test analysis conducted in R showed no significant differences in cases of inflected individuals between the languages with aspiration ($M = 254.9$, $SD = 159.5$) and the languages without aspiration ($M = 206$, $SD = 121.9$), [$t(18) = 0.73$, $p > .05$].



China at the same period were infected. The author added that Japanese aspirated stops like /p/, which are said to produce a lot of droplets, are not used that much in Japanese compared to English. Therefore, he concluded that the fact that Chinese shop assistants who might have been speaking to Japanese tourists in Japanese but to American tourists in English might explain the zero infection of Japanese tourists.

Although no statistical differences were found between the two types of languages, we observed that in countries in which the dominant language has aspirated consonants there were more cases of individuals infected by COVID-19 in comparison to countries in which the dominant language does not have aspirated consonants. These findings

can offer epidemiological implications for COVID-19 transmission in each country since this transmission may be based to some extent on whether there are or no aspirated consonants in the dominant language spoken in each country.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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