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Short Communication

An Epidemiological Study of COVID-19 in Adolescents, Youth, and Older Adults in Six US States Prior to Vaccine Availability

Barbara Rumain[1,2*], Moshe Schneiderman[3], Allan Geliebter[4]

[1]Department of Pediatrics, New York Medical College, Valhalla, New York, USA; [2]Department of Psychology, Touro College and University System, New York, USA; [3]Department of Pediatrics, SUNY Downstate College of Medicine, Brooklyn, New York, USA; [4]Department of Psychiatry, Icahn School of Medicine at Mount Sinai, New York, USA

ABSTRACT

A number of studies in Europe and China have reported that adolescents were considerably less susceptible to COVID-19 than older adults. In the summer 2020, before vaccines were available, we examined data from Department of Health websites in the six states, that had experienced a surge of cases, to assess prevalence of COVID-19 s, in adolescents and youth as compared to older adults. We also looked at two other measures related to prevalence: 1) the relation to expected cases, the (percentage of cases observed in a given age group divided by percentage of cases expected based on population demographics); and 2) the percentage deviation, or (% observed—% expected)/ % expected.

We found that prevalence of COVID-19 for adolescents and for youth was significantly greater than for older adults ($p<.00001$), as was percentage observed ÷ percentage expected ($p<.005$). The percentage deviation was also significantly greater in adolescents/youth than in older adults ($p<0.00001$) when there was an excess of observed cases over what was expected, and significantly less when observed cases were fewer than expected ($p<0.00001$). Our results are contrary to previous findings that adolescents are less susceptible than older adults. Since vaccines were not yet available at the time period of our study, vaccination of older adults was not a contributing factor.

Keywords: Susceptibility; COVID-19; Prevalence; Percentage deviation

DESCRIPTION

The susceptibility of adolescents (10-19) and youth (15-24) to COVID-19 has been a matter of controversy. In the very early studies conducted in China, Dong et al. [1], Lu et al. [2], and Bi et al. [3] reported that adolescents were susceptible, with the latter reporting that the rate of infection in all age groups was similar. However, Zhang et al. [4], in a study in Hunan province, China, concluded that older adults were the most susceptible, those in the first half of adolescence least susceptible, and youth (15–24) were intermediate in susceptibility. Geliebter, Rumain and Schneiderman [5] attempted to replicate Zhang et al.'s statistical analyses but obtained results in line with those of Bi, et al., indicating a similar infection rate acoss all the age groups.

Other data from Europe also indicated that adolescents were less susceptible than adults (e.g., Kuchar et al. in Warsaw [6]; de Lusignan et al. [7] in England). Meanwhile Viner et al. [8], after a meta-analysis of 32 studies, concluded "children and adolescents younger than 20 years had 44% lower odds of secondary infection with SARS-CoV-2 compared with adults 20 years and older." And, a mathematical model by Eggo and her colleagues [9] estimated that the susceptibility of adolescents 10-19-year-olds, mean =.38, or less than half that of older adults, ages 60+, mean =.81, and that youth in their early 20s have a susceptibility almost equal to that of older adults. However, no U.S. data were included in their model.

In our study, we accessed online tables containing COVID-19 case data from state Health Department websites of six states (Florida, Kansas, Missouri, South Dakota, Tennessee, and Utah)

Correspondence to: Barbara Rumain, Department of Pediatrics, New York Medical College, 40 Sunshine Cottage Road, Valhalla, New York 10595, E-mail: barbara.rumain@touro.edu

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when there was a surge in cases, defined as follows: After at least a 1-month plateau in the 7-day average of daily number of new cases, there is a dramatic increase of at least 100% in the 7-day average number of daily new cases from the plateau 2–3 months prior, which lasts at least one month, as reported for the states in the New York Times 'COVID Map and Case Count' [10].

In all six states, we found that: (1) prevalence of COVID-19 for adolescents and youth was significantly greater than for older adults, p<.00001, as was (2) the ratio of observed to expected cases, p<.005; (3) In states where the number of observed cases exceeded the expected (Utah, Missouri and Kansas), the deviation was significantly greater in adolescents/youth than in older adults, p<0.00001. In states where observed cases were fewer than expected (Florida, Tennessee, South Dakota), the deviation for older children/youth was significantly less than that for the older adults, p<0.00001 [11].

CONCLUSION

Our data are consistent with the most recently available pediatric case data in a recently released report, issued by the American Academy of Pediatrics. As of April 5, 2021, the American Academy of Pediatrics reported 3,782,724 total confirmed child COVID-19 cases in children <18 years old. Thus, children and adolescents are quite susceptible and the prevalence of infection, in the six states we examined, was significantly greater in adolescents and youth than it was in older adults. Since the data we used in our analysis are from summer 2020, before any vaccine was available, they cannot be attributed to the vaccination of older adults.

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