

Effect of age on death due to coronavirus disease 2019 (COVID-19): Application of Poisson regression model

To the Editor

As you know that, now-a-days, coronavirus disease 2019 (COVID-19) has become a pandemic disease that was first identified in the city of Wuhan in China with an outbreak of pneumonia without a clear cause in December 2019. Recently, there exist no effective treatment procedures that can control this disease.¹ However, many clinical trials

and research works are undergoing to invent the effective vaccines or anti medications to lessen the dangerous consequences of COVID-19. Additionally, several observational studies also conducted to understand the epidemiological characteristics of this pandemic disease.

A recent study conducted by "The Novel Coronavirus Pneumonia Emergency Response Epidemiology Team" in February 17, 2020 to

TABLE 1 Parameter estimates of Poisson regression model to explore the causal effects of age on death due to COVID-19 pandemic

Characteristics	Deaths N (%)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Age group (y)	—	—	—
0-29 (Reference)	8 (0.8)	—	—
30-39	18 (1.8)	2.25 (0.97, 5.48)	2.68 (1.23, 6.52)*
40-49	38 (3.7)	4.75 (2.33, 10.97)***	6.32 (3.68, 12.57)***
50-59	130 (12.7)	16.25 (8.50, 36.14)***	17.67 (8.57, 42.77)***
60-69	309 (30.2)	38.62 (20.52, 85.11)***	42.24 (20.48, 103.47)***
70-79	312 (30.5)	39.0 (20.72, 85.93)***	42.57 (22.81, 104.39)***
Above 80	208 (20.3)	26.0 (13.74, 57.49)***	28.78 (16.15, 67.74)***
Sex			
Male (Reference)	653 (63.8)	—	—
Female	370 (36.2)	—	3.254 (0.98, 7.23)
Occupation			
Service industry (Reference)	23 (2.2)	—	—
Farmer/labourer	139 (13.6)	—	6.25 (0.89, 8.56)
Health worker	5 (0.5)	—	8.23 (0.65, 10.42)
Retiree	472 (46.1)	—	13.55 (0.76, 17.15)
Other/none	384 (37.5)	—	16.35 (0.64, 19.25)
Province			
Hubei	979 (95.7)	—	12.23 (0.85, 18.25)
Other (Reference)	44 (4.3)	—	—
Comorbidity condition ^a			
Cancer (any) (Reference)	6 (1.2)	—	—
	161 (31.9)	—	2.76 (1.23, 5.26)*
Diabetes	80 (15.9)	—	3.25 (1.13, 4.25)**
Cardiovascular diseases	92 (18.3)	—	15.23 (5.63, 24.24)***
Chronic respiratory disease	32 (6.3)	—	16.25 (0.99, 19.25)
None	133 (26.4)	—	11.25 (0.75, 16.23)

Abbreviation: CI, confidence interval.

^aThe comorbidity condition variable includes 504 deaths and rest of the values were missing and this 504 death patients were considered to calculate percentages in the deaths columns.

*** $P < .001$; ** $P < .01$; * $P < .05$.

understand the summary characteristics of patient; age distributions and sex ratios; case fatality and mortality rates; geo-temporal analysis of viral spread; epidemiological curve construction; and subgroup analysis.² However, the true effect of age is not clear. I have analysed the dataset extracted from this article to know the actual effect of age on death due to COVID-19 by applying a Poisson regression model.

In the published article,² there were a total of 72 314 patients with 44 672 (61.8%) confirmed cases, 16 186 (22.4%) suspected cases, 10 567 (14.6%) clinically diagnosed cases (Hubei Province only) and 889 asymptomatic cases (1.2%). I have extracted the number of deaths along with the age distribution, sex, several comorbidities, occupation and province of recorded patients and performed a Poisson regression model to explore the adjusted as well as unadjusted effects of age distribution on death due to COVID-19. The odds ratios (ORs) with 95% confidence intervals (95% CIs) were shown in Table 1. Note that, we considered only age distribution of the patients as the independent variable to measure the unadjusted effects of age on death.

From Table 1 it was observed that as age increases the odds of death due to the disease also increases significantly. For example, the patient who belongs to the age group 40-49 years have 4.75 [OR = 4.75, 95% CI (2.33, 10.97)] times higher odds of death due to COVID-19, compared with the patient who belongs to the age group 0-29. ORs for the rest of the age groups increase rapidly. To be specific, the ORs for the age group 50-59 years, 60-69 years, 70-79 years and above 80 years were 16.25, 38.62, 39.0 and 26.0, respectively. It is interesting to observe that the odds of death still increased with the increasing age when demographic and clinical variables were added to the model (see, Table 1, adjusted odds ratio). Besides age, this study also indicates that hypertension, diabetes and cardiovascular diseases also have significant positive impacts on COVID-19 patients.

In the previous study, the death rate of COVID-19 was found higher in higher ages.² However, there was no clear evidence of

the actual effects of age on death due to this disease. My analysis explores a significant association between age and death due to COVID-19. Since higher age have serious effects on death, I suggest the older people to strongly maintain the health precautions such as avoiding social gathering, wash hand in a regular basis, take advice from a doctor whenever face several health problems and eat healthy foods etc Moreover, the COVID-19 patients whose have the comorbidities such as hypertension, diabetes and cardiovascular diseases should be more careful since the comorbidities have significant effects on novel coronavirus disease.

DISCLOSURE

The authors have declared no conflicts of interest for this article.

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