SARS-CoV-2: fear versus data

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Abstract

The novel coronavirus from China (SARS-CoV2) is spreading in the World, creating a huge reaction despite its current low incidence outside China and the far East. Moreover, it is not compared to the 4 current circulating coronaviruses that cause millions of case in the World. Here, we compare incidence and death rate of these 4 common coronaviruses to that of SARS-COV2 in OECD countries. We conclude that the problem of SARS-CoV2 is probably overestimated so far, as 2,6 millions people die annually of respiratory infections versus less than 4000 for SARS-CoV2 so far.

Keywords: COVID-19; coronavirus; SARS-CoV-2

Introduction

Coronaviridae represent a very important family of animal and human viruses (1; 2) that circulated permanently. These four common human coronaviruses (HKU1, NL63, OC43, E229) represent between 10 to 20% of respiratory infections worldwide and are present in all continents (3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14) (Table 3). Mortality is poorly assessed, but it is clear that there are chronic carriers as well as asymptomatic carriers. There are even two studies, one carried out by our team showing that there are as many asymptomatic carriers as symptomatic patients, and a second carried out in Ghana that shows that the number of asymptomatic carriers was not significantly different from the number of symptomatic carriers (3; 9). Since then, three epidemic episodes of emerging coronaviruses have been reported. The first, the SARS virus, has had very little impact on global morbidity and mortality since there have been more than 8000 recognized cases and 774 deaths (15; 16). The second, MERS-Coronavirus, remained localized in Saudi Arabia, with a small epidemic of mainly nosocomial infections in South Korea (17). The MERS-Coronavirus, like SARS, have highlighted the major danger of nosocomial transmission to healthcare personnel who must absolutely be preserved in these epidemics (18). Finally, SARS-CoV-2 that appeared in December has expanded and has now affected more than 90,000 people worldwide (2; 19; 20). However, there is a significant number of cases only in the Far East so far. It is incontestably contagious since the example of a quasi-experimental study on the Diamond Princess cruise-ship that showed that if one locked up infected patients with uninfected patients, uninfected patients very quickly become infected in a confined world, and thus more 700 cases were diagnosed on this cruise-ship (21). However, commonly-circulating coronaviruses remain globally very predominant in the global situation because of their global distribution and their non-negligible mortality (22; 14). In this study, we wanted to share the experience of a reference laboratory representing around 1% of serious and diagnosed forms of respiratory infections, particularly seasonal, in France. This will allow evaluating the relative mortality of different human coronaviruses presented in hospitals in Marseille, compared to that of the Chinese coronavirus as it has appeared for the moment in countries with the same economic development, including France.

Materiel and methods

Assistance Publique – Hôpitaux de Marseille (AP-HM) is administrating all public hospitals in Marseille, France, including four university hospitals: La Timone hospital, Conception Hospital, North Hospital and South hospital, corresponding to 3,400 beds and 125,000 admissions each year (23). IHU Méditerranée Infection diagnosis laboratory is testing all samples from AP-HM in which respiratory viruses are suspected. The diagnosis is performed through molecular biology analysis. The results are monitored by a weekly automated surveillance system in IHU Méditerranée Infection, coupled to a laboratory information system (Nexlabs) (23). SARS-CoV-2 epidemiological data were obtained through an online platform gathering data from public agencies (24). Statistical analyses were performed by using BiostatGV online-software.

Results

In 2016, a total of 594 000 people deceased in France, among which 59,2% deceased in a care establishment (25). In 2016, a total of 2854 patients deceased in AP-HM hospitals. We can therefore estimate that each year, around 0,8% of people that deceased in care establishments in France died in AP-HM. This estimate allows us to have an idea of the number of peoples affected by a pathogen in France according to the number of people who died each year at the AP-HM.

From January, 1st 2013 to December, 31th 2019, 21 662 samples were tested by the AP-HM diagnosis laboratory. Among these, 770 samples were positive for coronavirus, of which 8 died (Mortality rate: 1%). Among identified coronaviruses, 63 were identified as Coronavirus HKU1 (1 died, Mortality rate 1.6%), 74 were identified as Coronavirus NL63 (2 died, Mortality rate 2.7%), 92 as Coronavirus E229 (1 died, Mortality rate 1.1%) and 160 as Coronavirus OC43 (4 died, mortality rate 2.5%). 381 Coronavirus, diagnosed before 2017, were not assigned to any of these four strains (Table 1).

We performed systematic testing (molecular biology) in the context of SARS-CoV-2 from January, 1st 2020 to March, 2nd 2020, 7059 samples from patients presenting viral infections symptoms were tested by AP-HM diagnosis laboratory. Among them, 543 samples were positive to Coronavirus with 2 deaths (Mortality rate: 0,36%): 277 were positive to Coronavirus HKU1, 146 Coronavirus NL63, 77 to Coronavirus OC43, and 43 to Coronavirus 229E. No SARS-CoV-2 have been identified among these samples. One patient died with Coronavirus OC43 (Mortality rate 1,3%) and 1 patient died with Coronavirus HKU1 (Mortality rate 0,36%). No patients died with Coronavirus NL63 and E229 during this period.

During the same period, IHU Méditerranée Infection has been the regional center for the detection of the novel coronavirus SARS-CoV-2. A total of 596 analyses were performed on suspect patients since the emergence of the novel pathogen, among which 4 were positive to the SARS-CoV-2, and 709 were performed on French returnees from the Hubei province, all negative.

Until the 2nd of March 2020, a total of 90 307 patients were tested positive to SARS-CoV-2 in the world, among which 3086 died (mortality rate 3,4%). Including OECD countries only, 7476 patients were tested positive to SARS-CoV-2, among which 96 died (Mortality rate 1.3%) (Table 2). In France, 191 people were tested positive, 3 died (Mortality rate 1,6%).

We compared the mortality rate of Coronavirus SARS-CoV-2 in OECD countries (1,3%) with the mortality rate of common coronaviruses identified in AP-HM patients (0,8%) from January 1st, 2013 to March 2nd, 2020. We performed a $\chi 2$ test on these values. The p-value was 0.11 (not significant).

Discussion

In this work, we highlight that the mortality of common Coronavirus infections is of 0.8% in France. This is to be compared with the mortality of the SARS-CoV-2 in the European or American developed countries of comparable economic level, which is of 1,3% (Table 2). If our extrapolation of deaths in AP-HM is true, in metropolitan France this would represent 543 / 0.8 * 100 = 67,875 cases of patients hospitalized with a respiratory infection with common coronaviruses in two months, almost as much as SARS-CoV-2 in the world. In fact, mortality from respiratory infections is extremely dependent on the quality of care and access to care, and severe forms have a better prognosis in countries with superior medical infrastructures. Under these conditions, there does not seem to be a significant difference in the mortality of Coronavirus SARS-CoV-2 in OECD countries with an economic level comparable to that of common coronaviruses (χ^2 test p=0.11). Of course, the major flaw in this study is that the percentage of death attributable to the virus is not determined, but this is the case for all of the studies reporting respiratory virus infections, including those of SARS-CoV-2. Indeed, viral infections are ecosystem infections where the outcome depends on the inoculums and the surrounding microbiota (26). Thus, certain bacteria seem to be associated with symptomatic manifestations, such as *Streptococcus pneumoniae, Haemophilus influenzae,* and *Staphylococcus aureus*, which are known to be the bacteria causing an excess of mortality due to secondary infection. Finally, seasonality, geographic location, heat, humidity are co-factors, as are age, gender and underlying pathologies. Under these conditions and all other things being equal, the disease with SARS-CoV-2 cannot be described as being statistically more severe than that linked to currently circulating other coronaviruses .

Finally, in particular in OECD countries, the SARS-CoV-2 does not seem to be particularly deadlier than other circulating viruses. In addition to coronaviruses, there are 16 endemic viruses commonly circulating in developed countries (Adenovirus, Bocavirus, Cytomegalovirus, Enterovirus, Influenza A H1N1 virus, Influenza A H3N2 virus, Influenza B virus, Metapneumovirus, Parainfluenzae virus 1, Parainfluenzae virus 2, Parainfluenzae virus 3, Parainfluenzae virus 4, Parechovirus, Picornavirus, Rhinovirus, Syncytial respiratory virus) and 2.6 million deaths from respiratory infections (apart from tuberculosis) per year have been noted in recent years in the world (27). There is little chance that the

emergence of SARS-CoV-2 could change this statistic significantly. Fear could have a larger impact than the virus itself: a first case of suicide motivated by the fear of SARS-COV-2 has been reported in India (28).

In addition, coronaviruses that have rarely been tested systematically around the world may persist in the pharynx of asymptomatic people being a potential source of population immunity (29).

Furthermore, it should be noted that in systematic studies that have been carried out for other coronaviruses (but not yet for SARS-CoV-2), the percentage of asymptomatic carriers is equal or even higher as compared to symptomatic patients. We may soon have the same data for SARS-CoV-2, which will further reduce the relative risk associated with this specific pathology.

Declarations

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Competing Interests : No

Ethical Approval : Not applicable. Testing of repatriates was approved by the ethical board of the Committee for the Protection of Persons (CPP Ile de France VI dated 06–02–2020).

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234 Table 1: Results for AP-HM diagnosis laboratory

Agent	Location	**Confirmed cases**	**Deaths**	**Rate**
Coronavirus*	AP-HM, Marseille, France			
Coronavirus OC43		160	4	0,0250
Coronavirus NL63		74	2	0,0270
Coronavirus HKU1		63	1	0,0159
Coronavirus E229		92	1	0,0109
Coronavirus**	AP-HM, Marseille, France			
Coronavirus OC43		77	1	0,0130
Coronavirus NL63		146	0	0
Coronavirus HKU1		277	1	0,0036
Coronavirus E229		43	0	0

* From 2013-01-01 to 2019-12-31

** From 2020-01-01 to 2020-03-02

235 Table 2: SARS-CoV-2 international epidemiological situation (OECD countries)

236 Consulted on 03 march 2020, 9.00 GMT

Countries	Confirmed cases	Deaths	Rate
Germany	157	0	0,0%
Australia	30	1	3,3%
Austria	18	0	0,0%
Belgium	8	0	0,0%
Canada	24	0	0,0%
South Korea	4335	28	0,6%
Denmark	4	0	0,0%
Spain	123	0	0,0%
Estonia	1	0	0,0%
United States	100	6	6,0%
Finland	7	0	0,0%
France	191	3	1,6%
Greece	7	0	0,0%

Ireland	1	0	0,0%
Iceland	3	0	0,0%
Israel	10	0	0,0%
Italy	2036	52	2,6%
Japan	274	6	2,2%
Latvia	1	0	0,0%
Lithuania	1	0	0,0%
Luxembourg	1	0	0,0%
Mexico	5	0	0,0%
Norway	25	0	0,0%
New Zealand	1	0	0,0%
Netherlands	18	0	0,0%
Portugal	2	0	0,0%
Sweden	15	0	0,0%
Switzerland	38	0	0,0%
United Kingdom	40	0	0,0%
TOTAL	7476	96	1,3%

239 Table 3: List of studies that tested Coronavirus in fever cases in various countries

REFERENCE	COUNTRY	TESTED CASES	Diagnosis of Coronavirus
Trombetta	Brazil	775	7.6%
Zang	Guangzou China	13 048	244 (2.25%)
Zeng	Guangzou China	11 399	489 (4.3%)
Killerby	USA	18 806	2.2%
Kiyuka	Kenya	5 573	10.1%
Owusu	Ghana	593 cases	13.7%
Dube	South Africa	620 controls 214 (TB)	10.5% 8%
Sipulwa	Kenya	417	8.4%
Subramoney	South Africa	860	4.8%
Nunes	South Africa	1 026	15%
Le Viet	Viet-Nam	378	4 (1,05%)

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