The Rapid Spread of COVID-19 Outbreak: Analysis of Italy and Iran

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Abstract:

In the last few months, the COVID-19 pandemic has affected the lives of many people in different countries. The knowledge about the initial point and the ways that started in each country could be useful for future epidemics, thus leading to the main aim of the current study. The main aim of this study is to call the attention on the possible correlation of two strange and at first sight uncorrelated characteristics that seem to escape the analogical line of reasoning. The first development of the contagions in more than one hundred countries is analyzed. The results suggest that the outbreak may follow two different patterns. One is the normal spread of an infection from one parent case, and the other might be the consequence of a unique phenomenon of accumulation of contagious people, which subsequently develops according to the usual statistics. The second mechanism is suggested as a possible explanation of the spike in growth of contagions that took place the first days of the epidemic in Italy and Iran.

Key world: Iran; Italy; COVID-19; Outbreak burst

1. Introduction

In the last few months, the COVID-19 pandemic has been analyzed from many different points of view, virologic, environmental, epidemiological and statistical.[1-5] Pirouz et al., (2020a), analyzed the possible correlation between the trends of confirmed cases, climate data, and previous positive cases, using multivariate regression equations.[6]

Wang et al., (2020), analyzed the global COVID-19 outbreak and presented a new Patient Information Based Algorithm (PIBA) model to predict death rate. They used Wuhan database that shows the mortality caused by COVID-19 may be in the range of 0.75 percent to 3 percent.[7] Roda et al., (2020), analyzed many prediction models using Akaike Information Criterion (AIC) and considering a wide range of variations. Their results indicated that models that are more complex might not be more reliable for prediction. In addition, they used both SEIR and SIR frameworks to estimate the impact of a lockdown and traffic restrictions.[8]

Viral infections can spread through close contact and air droplets but case-infection ratio of each epidemic is different and can vary widely. The difference among different infections can be measured by case-infection ratio (p), which shows the correlation among the newly confirmed cases and the previous infected people. For seasonal influenza the ratio is about 1/100,[9,10] and for the SARS is between 1/5 to 1/2.[11] The impact of an epidemic in relation to sustainable development might be critical, and affect the previous efforts as many countries experienced epidemic of COVID-19.[12-15]

Pirouz et al., (2020b) presented an assessment method by proving the existence of a delay for each of the variables such as weather parameters and confirmed cases of COVID-19.[16] Chen et al. (2020) presented a time-dependent model to predict the total number of infected people.[17] The analysis show that the initial symptom of COVID-19 would be appear in 3 to 5 days in usual cases and there is some delay in total infected number of an specific date due to the required time for laboratory test [18-20].

The rich amount of data available on this pandemic allows to compare its development in different countries. The usefulness of such comparisons can be appreciated if one considers the uncertainties affecting most of the indicators whose time variation is followed to assess the development of the outbreak. In this paper, we shall focus our attention on the initial development of the outbreak. The data are available with a quite broad statistics for an increasing number of countries and, as we shall see, they deserve our attention.

The purpose of this work is to call the attention on the possible correlation of two strange and at first sight uncorrelated characteristics that seem to escape the analogical line of reasoning. The first of them is the intensity of the diffusion of the pandemic in Italy and Iran, the second the difference in duration of the initial outbreak.

2. Materials and Methods

2.1. Case study

To carry out the analysis, the dataset of three countries has been used, namely China, Iran, and Italy, as shown in Table 1, with the location of the selected case studies presented in Figure 1.

Table 1. The selected case studies[21-24]

Case study	Population	Density, population/km^2	Total confirmed cases until 26th March
Italy	60,550,075	201	80,589
Iran	82,913,906	50	29,406
China	1,433,783,686	148	81,943

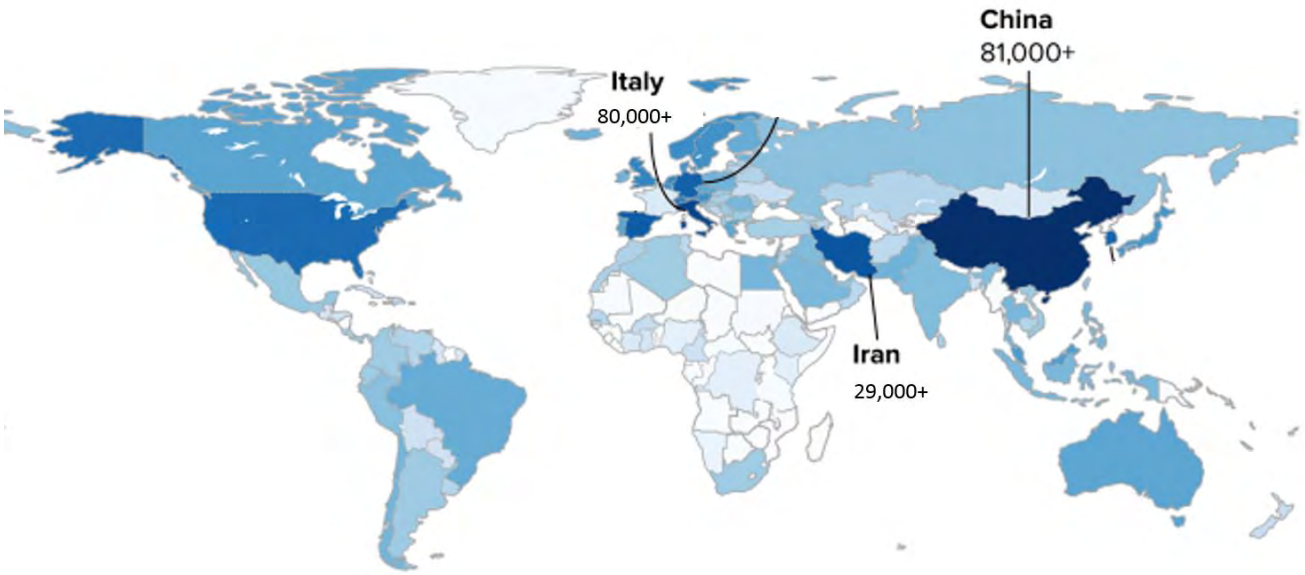

Figure 1. The location of three case studies[23, 25]

2.2. Main characteristics of the outbreak

It turns out that during the first weeks of the pandemic, its growth was very fast in two countries, Italy and Iran. In Italy the number of infected people reached the level of 5000 on 7 March 2020, and that of 10000 three days later. The latter level was reached in Iran on 12 March 2020*[1]. On 10 March 2020,

[1] One could argue that due to the size of the population this level would be comparable to the Italian one of March 7, even if actually, it was reached mainly due to the contribution of a limited zone of the country.

only South Korea had a comparable number of infected people (around 7500, but with a correlation we shall discuss in section 3), whereas the three major European countries affected by the pandemic had much lower levels, within a range of the order of 1500-1800.[24]

2.2.1. How the outbreak started in Italy

In the case of Italy, the first identified cases of infection were those of a Chinese couple from Wuhan, the epicenter of the pandemic, who arrived in Italy on the 23 January 2020. No evidence arose that they contributed to spread the disease. As a matter of fact, they were under strict control already on January 31, and the explosion of the pandemic in Italy started only three weeks later, in a region where they had been, but not in the specific area of the pandemic. On the basis of what is known about the time of incubation[26] and development of the sickness, the development of the epidemic in Italy cannot therefore be traced back to this couple*[2].

A study of the genomes of three of the first patients in Lombardy shared light on the problem of knowing how the outbreak probably started in Italy, suggesting that SARS-CoV-2 was present in the country weeks before the (unrelated) first reported cases of infection.[27] Anticipation of this result has appeared earlier in the press.[28] From the study of a number of cases from Germany, Finland, Mexico and Brazil the origin of the virus was traced back to China, and its appearance in Europe to mid-January. The origin might have been in a German businessman who got sick on 24 January 2020, few days after he had a business meeting with a Shanghai colleague.[29]

2.2.2. How the outbreak started in Iran

The spread of coronavirus in Iran has also been usually traced back to China.[30] Starting 27 January 2020, controls on the passengers coming from China were established with hospital isolation of suspicious cases. The first cases were observed on 19 February 2020 in Qom which became an epicenter of the epidemic, and four days later the number of contagions has reached 43. In a video conference, Iran's Deputy Minister of Health, announced that the origin of coronavirus in Iran was a number of students in Qom and Chinese workers who had traveled to Iran before 19 February 2020.[31]

Another epicentral zone was the North, and there have been speculations about a possible connection of the outbreak there with a weightlifting event, the 5th FAJR CUP Championship, held in Rasht from 2 to 5 February 2020, which convened about fifty weightlifters, from thirteen countries, along with referees, coaches, and instructors. Among them, there were two Chinese teachers who went to Rasht to participate in weightlifting classes and in international competitions.[32] However, on occasion of the presentation of the event the Director of Sport and Youth Department of Guilan (region to which Rasht belongs) said that "The two teachers had no problems and their visas were issued in cities where the disease had not spread, and they had permission from the Ministry of Health in China to leave the country, and they also were examined at Tehran airport and had no problem at all."[32]

2.3. China exports trade to other countries

One can consider China major trading countries for exports in 2019. Data are presented in Table 2, and compared with total confirmed cases of COVID-19 in Figure 2. Data of Table 2 and Figure 2 show that Italy and Iran are not the major economic partners of China.[33]

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[2] We recall that there is always some delay between the actual date that contagion takes place and its recognition in the statistics of the confirmed cases in the media, because of an incubation period estimated to be of about 2-14 days[4], with a mean observed incubation period between 3.0 and 5.2days [C4,C5]. Moreover, the number of infected people is necessarily underestimated because of asymptomatic vectors and delayed for the testing time protocol.

Table 2. China major trading countries for exports in 2019,[33] and total confirmed cases of COVID-19 [24]

Countries	Exports, Billions of USD	Percentage of total Chinese exports, percent	Total confirmed cases until 26th March
United States	419	16.8	82,179
Hong Kong	280	11.2	453
Japan	143	5.7	1,399
South Korea	111	4.4	9,241
Vietnam	98	3.9	153
Germany	80	3.2	43,646
India	75	3	722
Netherlands	74	3	7,431
United Kingdom	62	2.5	11,658
Taiwan	55	2.2	252
Singapore	55	2.2	683
Malaysia	53	2.1	2,031
Russia	50	2	840
Australia	48	1.9	6,847
Mexico	46	1.9	475
Italy	33	1.3	80,589
Iran	10	0.4	29,406

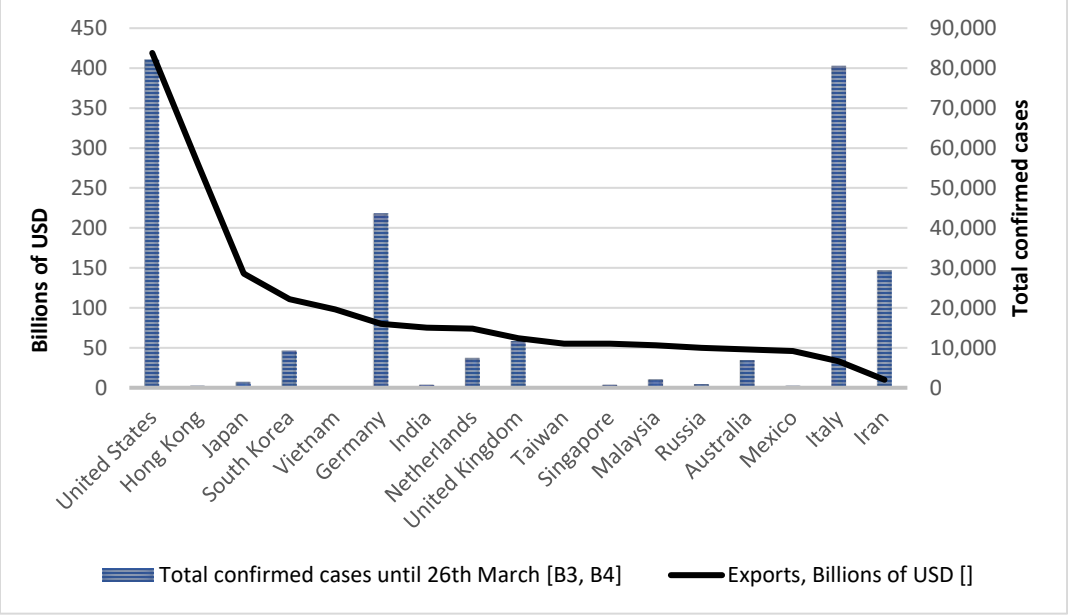

Figure 2. Country comparison of exports and total confirmed cases of COVID-19 [24, 33]

2.4. Analysis based on tourism number

Chinese tourism is certainly important, but one should consider that usually Chinese tourists make tours which include several European countries and in the case of Iran, prior to the COVID-19 pandemic, there were only just seven direct flights per week between Beijing and Tehran by Mahan Air Airlines, Iran Air Airlines, and China Southern Airlines.[34]

2.5. Assumptions and hypothesis

It is a reasonable assumption that the spread of the outbreak should exhibit similarities. Indeed, at first sight it is so, as indicated, for example, by the exponential growth of the infection, some delay between one country and another, the observed time correlation between the number of infected people and that of the deaths. What happened in Hubei, which also provides insight of the positive effect, after a suitable time of 13 to 14 days, of the implementation worldwide lockdown measurements, makes that case an excellent point of reference.

If the Italian outbreak started in Germany, and the Iranian one started with a merchant, why such explosion of contagions in Iran and Italy? These two countries do not have a particularly special connection with China. Others have much more numerous and stronger connections because of intense economic relations. One, for example, is Germany itself, where the virus apparently arrived around the same time as the two Chinese tourists to Italy.

Why the growth picked up Italy and Iran and did not occur with the same violence in countries whose ties with China are by far more important? Why such a difference also with other regions of China, like Hong Kong, or Macao, which certainty had a much larger interchange of persons with Hubei, and still now have relatively few infections? *[3]

The trace back to travels of individual businesspersons or investors is hard to be a convincing explanation, when one recalls China´s trade interchange with Iran and Italy and compares it with that with the rest of the world, US and Russia.

3. Results and discussion

From the previous discussion, it seems that the reason why the outbreak struck these two countries in the way it did, should be looked for in some specific event, **unique and of collective nature**, so that at a certain moment the spread of the pandemic was not the consequence of a parent case, but started with several cases that developed at the same time. This led to a faster development of the pandemic. In other words, after that event statistics and mathematical models will allow to understand the development of the pandemic, but they are not the instrument to describe what happened accidentally with special circumstances determining an acceleration in the number of infections. In a sense at different scale something like the unique event which led to the disappearance of dinosaurs.

We know that something of this sort happened elsewhere in this pandemic. The most studied case is that of South Korea. We mentioned that on 10 March 2020, this country had about 7500 infections. The accurate study of the contacts infected people had, has allowed to ascribe a large fraction (around 60 percent) of these infections to the case of the Shincheonenji church and of the patient 31 who had more than 1000 interactions, i.e. 250 percent more than the second and third case of individual contacts.[35]

A similar case is that of Malaysia, where the first case appeared on 25 January 2020 and for about 40 days the growth has been very slow. After that period, there was a rapid increase that led in a few days to reach the level of 673 contagions. About two thirds of this growth have been commented to be related to a large pilgrimage to the Sri Petaling Mosque.[36] The date of the event and the acceleration of the disease are compatible with the COVID-19 incubation time.

That event had a large international participation and this might explain a result noticed, but not explained, by one of us that same day,[37] namely that the analysis of the time elapsed in different countries to reach a certain reference level (30 infections) showed a great variability. It may not be an

[3] Jointly about 500

accident that out of the eight countries which were mentioned in reference 37 to exhibit the longer outbreak period, four, Malaysia, Australia, Cambodia and Vietnam, appear in the list of the countries participating in the pilgrimage, together with a fifth, Brunei, that on those same days jumped from one case to 50.

Thus, at least in these two cases, unique events happened to trigger a development of the disease not predictable on the basis of the statistical analysis of the current number of the infections in the previous days.

An instructive indication that the Italian burst was unexpected, comes from an interview published on the Italian press on 22 February 2020, on the eve of the sudden increase of infections in the country.[38] Professor Ricciardi, a member of WHO Executive Board and advisor of the Minister of Health, asked whether in Italy existed a risk of infection, answered "We cannot exclude it, …but we should say that it is very low".

Are the South Korean and Malaysian cases unique in this pandemic? Does this discussion suggest what might have happened in Italy and Iran?

A possible answer comes from the mentioned analysis of the time elapsed in different countries to reach a certain reference level that, afterwards, can be assumed as the starting point after which the outbreak develops again in a way described by the usual epidemic models.

As in reference 37, we consider the countries with at least 30 infections. In the meanwhile, their number has increased from 81 are 117.[6] Those which spent less than 21 days to reach that threshold are 90. The four major European countries we are considering all belong to the group of the remaining 27, whereas Iran is one of the ten countries where the outbreak developed in less than five days.

In Iran, in the first five days of the outbreak, the number of infected people was 2, 5, 18, 28, 43. In the four European countries we are considering such an acceleration took place only after a varying but significant number of days. In Italy, 21 days elapsed from the first cases to the acceleration of the growth, (3, 20, 62, 155, 229), in Germany, 27 days lasted the time to reach 17 cases, but the following days the development was slower than in Italy (27, 46, 48, 79), in France, 33 days were necessary to reach the level of 14 infections, and in the following days the number grew to 18, 38, 57, 100. In Spain also, the growth until 15 infections took 27 days, and the following days the number evolved to 32,45, 84, 120.

These differences appear in the initial phase of the outbreak, but do not affect its subsequent development, and in fact there have been several remarks suggesting that indeed Germany, Spain and France simply follow Italy with a certain delay.[39] Time translations in the behavior have also been observed in the behavior of the outbreak in Italy at regional level.[40]

Is there an explanation of these different trends?

3.1. Intense social activity

The rapidity of development of a pandemic basically depends on three parameters, the probability of transmission, which can be safely assumed does not depend on the country*[4], the number of contacts of an infected person, and the duration of these contacts.

If one assumes that the first cases are at the origin of the outbreak, the only possible explanation of variations between different countries could be due to some intense social activity either at individual level (like Korean patient 31) or at collective level, like the cases we discussed of Malaysia and South

[4] We disregard possible genetic differences in the population which might contradict this statement

Korea. However, such extraordinary events would certainly be considered when attempting to explain concrete behaviors of the outbreak of the disease. For example, it has been suggested in Italy that a local acceleration in the diffusion of the disease might have been consequence of the contacts prompted by a Champions Cup football match.[41]

3.2. Long duration of the contacts – Air and Rail travel

Long duration of the contacts could be an interesting possibility, in particular if they take place in a closed site with favorable conditions for the survival and development of the virus. A perfect environment of this type could be aircrafts, and, at a lower level, trains, buses and metro. It seems that air travel might be more interesting for these considerations because of the closer space, possible long duration of the trip, possibility of diffusion thanks to the air-conditioning system, frequent contacts between the passengers, use of small toilet spaces etc.

If conditions favorable to propagate of the infection are given, this could lead to disembark jointly a relatively high number of potential infectants and this could explain that a few days after, in the arrival country one registers a burst of cases. The possibility of the presence aboard of a possibly infected person led CDC (Centers for Disease Control and prevention) to provide a guidance for crew's behavior.[42] Essentially it covers the case of the accidental case of one potential infectant.

To evaluate this concrete possibility is important because of the tremendous economic implications of a reduction or the prohibition of the flights between two countries, not to say if the measure is applied worldwide.[43] We recall that, when Italy was the first country to cancel air connection with China, the decision was object of a complain of the Chinese Government[44] and its usefulness was put in doubt for several reasons, like impact on the economics,[45] and possibility of alternative routings and scientific evidence of the risk.[38]

The possible connection between air travel and transmission of the infection has been indeed considered in a number of papers and some information is available about the possibility of diffusion of similar diseases on airplane and case studies of the spread of an infection exist.

It would be naïve to expect that we may obtain in this way a conclusive support to the hypothesis that the burst of cases in Italy and Iran might be due to some infected flight arrival, not necessarily from China, and that a similar reason might stay behind the behavior of the pandemic in other countries. Nevertheless, the available literature information provides interesting elements which allow at least to say that this possibility is compatible with our present knowledge on this matter.

Discussion about the risk of flying or taking a train was published in Britain,[46] which underscored the increase of the risk associated with the overcrowding of a train. By itself, this rather obvious remark would not perhaps justify to pay a special attention to it, but that paper is interesting because it refers to two academic papers that a few years ago studied the problem of disease transmission in crowded spaces,[47] and the connection between airborne transmission of a disease and use of public transportation.[48] The second paper studies the relevance of the crowd density in a corridor, a problem which in an airplane applies to the real-life situation of the queues in front of the toilets, especially relevant in long-haul flights.

WHO evaluates as little the risk of a disease infection transmitted on flight referring specifically to TB and to the 2003 SARS outbreak, whose experience was considered to provide a very low evidence.[49] Actually, the only published paper we found on that outbreak, source for many other analyses of the case, is the study of an infection originated by a passenger flying in 2003 from Hong Kong to Beijing.[50] The statistics is very limited, and the flight in question was the only one out of eight taken by infected passengers on which an outbreak arose.

In that case the illness affected 18 and possibly four more people, out of the 120 persons onboard, 65 of whom were actually contacted. The seating distribution of the infected passengers showed that the infection spread beyond the limits of the two rows and nearby people, definition which would have missed 45 percent of the cases. A very enlightening analysis of this case and more generally of the possibility of flight transmission of diseases[51] stressed that the perception of this risk is higher than the actual risk.

The possible inaccuracy of the 2-row rule is confirmed by Hertzberg and Weiss,[52] who analyzed seven cases of outbreak developed on a commercial flights (two of which of SARS, being however the Hong Kong -Beijing one by far more significant) and found 39 cases within the 2 rows against 37 beyond the two rows to be compared with a seating of 343 and 750 passengers within and beyond the two rows. However, this result is questioned by a subsequent study of a group including the same authors, where a social experiment has been carried out following the movement and behavior of the passengers and the crew on ten intercontinental US flights.[53] The results are more conservative (one row) and propose different moments of contact to explain the results for the cases of SARS and influenza analyzed in reference 52.

It makes little difference in relation to further development of an illness whether the contacts took place when waiting at the airport, boarding or deplaning, except naturally that, the duration of the flight is relevant for tribe passengers, whereas for non-tribe passengers the time dependence implied by the Wells-Riley equation[54] is irrelevant.

However, the consideration of the boarding process deserves a comment. The importance of this phase of the air travel as possible trigger of contagions has been stressed in connection with the Ebola outbreak[55] studying the connection between boarding procedures and risk of infections. It was found that the simple consideration of boarding time[56] is not optimal and that the slightly longer time requested by random boarding is compensated by the reduction of the contacts. It should be underscored that the philosophy of reference 30 is precisely that of providing recommendations for possible new pandemic.

Another complex problem to consider in order to assess the probability of air-flight driven triggering of an epidemic is that of how the ventilation system of the plain may favor or disfavor the diffusion of a sickness. There is consensus in the literature that the mechanism of air renewal should protect the passenger. In an airplane the ventilation can be ensured by different systems. The air replacement mechanisms change completely the air every two to three minutes, whereas in an air-conditioned building it is every 10-12 minutes, but for what concerns infection risk the result varies according to the type of ventilation and a model calculation which used phenomenological data from the 2003 accident showed that displaced ventilation is preferable to the mixed ventilation.[57] Of course, this safety guarantee loses significance in case of failures in the ventilation system and the effect could be terrific as it happened in 1977, when 38 out of 54 passengers and crew of a commercial flight became infected after three hours in an airplane without air conditioning.[58]

It is beyond the scope of this work to discuss how far COVID-19 may travel and survive in the temperature and humidity conditions of an aircraft.

3.3. The development trend in different countries

We prefer to conclude this discussion recalling a number of facts we have shown. It is a fact that the way COVID-19 pandemic developed in different countries exhibits differences. It is a fact that in certain countries the development has been in form of a burst and in others slower. It is a fact that the further development takes place according to analogous behaviors, irrespective of that one-moment event.

This suggests that there might have been unique events that might have triggered the outbreak when a sudden change in the development is observed. In some cases, Malaysia, South Korea and possibly Brunei, we have an indication of events that probably have a causal connection with the outbreak of the pandemic. In the case of Italy and Iran we are not aware of similar events. A possible explanation of the different trend of development of the pandemic in these two countries might be that there was a unique event of accidental cooperative nature, like the arrival of a group of infected persons on a plane or a bus or a train, which brought at the same time in the country several vectors or the realization of some crowded event. This led to a step behavior in the development which afterwards continued with a behavior similar to that of the countries where such an event did not occur.

Is it possible to check this suggestion? Perhaps yes, the Korean experience would suggest to look at the contact description of the people who got infected within five or six days from the change of trend of the infections. But this could be simply a curiosity. Instead, we must consider that the pandemic is still developing in many countries, and even more important in each country starting in different ways in different places. These remarks may suggest a guideline for the first actions in case a similar situation occurs in some country, region or city where the development of the pandemic still follows the slow path.

3.4. The events that possibly affect the rate of epidemic in Iran and Italy

We cannot refrain from remarking that two news appeared in the Italian press shortly after the first preliminary redaction of this paper would fit nicely with the possibility that the accelerated behavior of the epidemic in Lombardy may not be the result of a slow continuous spread of sickness, but there was a burst which triggered it.

The first was the suggestion that at the origin of the spread of the virus in Italy might have been an ice-cream Fair held in Rimini where stands from Wuhan and Codogno – one of the first areas in Italy to be affected by the pandemic – had been close to each other in a moment compatible with the incubation characteristics of COVID-19.[59] However, this interesting possibility, in view of the time elapsed between that meeting and the Italian COVID-19 burst probably could only be compatible with the incubation times of the sickness if one assumes that the burst was a secondary result of the infection at the Fair. Today another paper appeared on L'Espresso[60] puts in evidence a linkage between the epidemic map in Lombardy and the network of public transportation in the region with several additional details about the study of this possible correlation that, to a large extent agree with our findings.

5. Conclusions

In this paper, the initial development of the outbreak attention has been investigated to call the attention on the possible correlation of two strange and at first sight uncorrelated characteristics that seem to escape the analogical line of reasoning. The analysis of the development rate of the pandemic in 117 countries with at least 30 contagions suggests that the rapid spread of COVID-19 in Italy and Iran. It also resents some similarity with the characteristics of the outbreak in Malaysia and South Korea and might be due to a collective spread of the infections. Ideal mechanisms to initiate this chain reaction are air and rail transport, because of their particularly favorable environmental conditions. No identification of the triggering event has been possible, although in the press some suggestions have been made.

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Appendix A:

Addendum

After the first Internet diffusion of this paper, we received one comment that stimulated further research. The comment came from a colleague of the Centro de Modelamiento Matemático of the University of Chile, professor Servet Martínez, friend since long time of one of us (G.V.) and with a personal linkage to Iran, having been awarded the prestigious Khwarizmi Prize. He observed that an explanation of what was suggested was missing and that further research would be opportune.

Of course, it is probably impossible, one month after, to find the smoking gun of the pandemic in Iran and Italy, even if, as we mentioned, some suggestion has been made for Italy.[59, 60] However, the increase of the available data about the pandemic development worldwide can provide evidence at least of the fact that its initial development in Iran and especially in Italy had a behavior that makes it, if not unique, at least different from that of the majority of countries.

Here we shall present some data[2] which support this statement.

The pandemic evolution between March 11 and March 18 in Latin American countries having now more than 800 contagions is presented in the following table

Table A1. The pandemic evolution between March 11 and March 18 in Latin American countries

Country	BR	CH	AR	EC	CR	PE	CO	ME	PA	DR	UY
11/3	38	23	19	17	13	11	9	8	8	5	0
18/3	372	238	79	111	50	145	93	93	86	21	50
Ratio	9.8	10.3	4.2	6.5	3.8	13.2	10.3	11.6	10.75	4.2	-

One can notice that in six countries the ratio was of the order of 10, while in the remaining four, for which such calculation was possible, it was about one half of that.

We analyzed the times of deduplication of the contagions in the fifteen countries with more than 5000 contagions.

We considered the time required to reach 100 from 10, 1000 from 100, 5000 from 500, and 10000 from 1000. Of course, if the available data tell us the day when these reference values were reached, the actual value are not exactly in a 1:10 ratio. In order to take into account this, we followed the procedure described in the following example.

United States reached the level of 10000 on 12 March 2020. That day, the reported number of contagions was 10995. Therefore, we looked for the day when the contagions had been 1099. Obviously, we could not expect to find this value, and indeed we found that on 11 March 2020 the number was 1281 and on the 10th it was 959. We assumed a linear dependence on time during the day, and this gave as result 7.57 days.

Our results are presented in the following table. We remind that the first six countries have more than 20000 contagions, the next four more that 10000 and the last five more than 5000.

The results of our analysis of the 15 countries are presented in the following table, where one data is marked with an asterisk, having been calculated with a different, though equivalent, procedure for a reason to be explained later.

Table A2. The analysis of the fifteen countries

Country	10 → 100	100 → 1000	500 → 5000	1000→ 10000
United States	13.00	8.20	8.62	7.57
Italy	2.29	6.48	9.33	10.43
China	n.a.	n.a.	6.58	7.00
Spain	5.14	7.36	5.29	7.20
Germany	7.00	7.24	9.11	9.43
France	5.50	7.60	9.30	11.15
Iran	4.69	4.07	6.39	10.96
United Kingdom	8.00	9.00	9.59	11.53
Switzerland	5.70	8.00	9.77	12.54
Netherland	4.37	9.30	12.49	13.87
Belgium	3.40	10.05	12.40	12.86
South Korea	2.46*	5.08	9.49	-
Turkey	2.75	3.75	6.32	-
Austria	7.80	8.08	10.84	-
Canada	14.35	9.48	10.55	-
Portugal	7.36	7.29	9.82	-

In the case for South Korea it is due to the way in which the outbreak took place there. This suggested to calculate instead, using the same procedure, the time between the end of the initial plateau and the moment the value was ten times larger.

The peculiarity of the beginning of the outbreak in Italy, South Korea and Iran is confirmed and, since some days, it seems that it is shared with Turkey as well. The average value of the first column, excluding these countries is 7.42. Again, this is not an explanation of what happened, but the triggering of the pandemic in those countries seems to be confirmed.

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