Research Article

Minimum Incidence Rates of Covid-19 Infections in the Endemic Period from October 2022 to October 2023, In a General Medicine Office, In Toledo (Spain).

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Abstract

Background: Since the disappearance of the health alarm in many countries, cases of covid-19 are not counted. Consequently, the incidence rate of covid-19 infection in the current period of endemic is not clearly known.

Objective: Estimate the "minimum incidence rates" (when estimates do not necessarily cover the entire population) in the general practitioner care.

Methodology: Longitudinal study of covid-19 cases from October 1, 2022 to October 1, 2023 in a general medicine office in Toledo (Spain); the descriptive epidemiological analysis considered a set of selected demographics, psychosocial and clinical characteristics. Incidence rate was calculated by dividing the number of cases of covid-19 in the follow-up time. The incidence data were extrapolated to the population that depended on that clinic.

Results: 76 cases of Covid-19 were included during the study period. The crude minimum incidence rate of covid-19 infections in general medicine for the entire population served (=> 14 years) was 3.8%. It was greater in > = 65 years (6.0%), in women (4.5%) vs. men (2.9%). It was for cases of moderate-severe severity of infection 0.1%.

Conclusion: The minimum incidence rates of covid-19 infections in general medicine indicate figures to consider both with respect to the crude rate for the entire population, and with respect to cases of moderate-severe severity. The importance of data from general medicine consultations is suggested to more realistically approximate the incidence figures during the endemic phase of covid-19.

Keywords: Covid-19, Sars-Cov-2, Population Surveillance/Methods, Public Health Practice and General Practice.

1. Introduction

Coronavirus disease 2019 (covid-19) is no longer in the epidemic/pandemic phase [1]. Many countries are currently adopting strategies to manage covid-19 as an endemic disease. Epidemiologically, Covid-19 can be defined as endemic when it exists at a predictable level that does not require special socio-health interventions. Although it is desired that this level be zero, eliminating the disease is not feasible [2]. If Covid-19 becomes endemic, it will be present at a certain level in a population at certain times of the year or throughout the year. A disease that is not eradicated is, by definition, endemic. This does not necessarily mean that it is circulating at low levels [1].

In the pandemic period a very detailed surveillance was crucial [1]. We are now in an endemic phase, where many of the community surveillance studies that track infection levels have ended. Since the disappearance of the health alarm in many countries, cases of covid-19 are not counted, and tests are carried out in health services only in certain situations, such as in people over 60 years of age, pregnant women, hospitalized patients, and health personnel, so people with symptoms in the community, who do not meet these criteria, frequently choose to take specific tests at home. This fact that covid-19 case counts are no longer published means that it is not clear how many people are infected, and that the evolution of new waves cannot be assessed [3-5].

In this scenario, the official figures can imply under-reporting and the incidence of covid-19 and its evolution over time in the community are truly unknown. But, frequently (although predictably not 100%), people with a positive test at home do communicate this circumstance to their family doc-

tor, to seek treatment and/or sick leave. In this way, knowing the incidence of covid-19 cases reported and diagnosed for the GP, will allow correcting the probable under-recording of official data (which are frequently obtained from sample data from selected sentinel surveillance centres), although it will still represent a "minimal incidence", since there will be sick people who do not take a test at home, and who, even if they are positive at home, do not report it to the GP [6].

In summary, there is a lack of community data on the evolution of the number of cases of covid-19 from epidemic to endemic. In this context, we present an observational, longitudinal and prospective case series study of adult patients with covid-19 infections in general medicine from October 1, 2022 to October 1, 2023, with the objective of knowing the "minimum incidence rates" (when estimates do not necessarily cover the entire population) [7]. According to certain selected clinical-epidemiological characteristics of new cases of covid-19.

2. Material and Methods
2.1. Design and Emplacement
An observational, longitudinal and prospective study of covid-19 reinfections was conducted from October 1, 2020 to October 1, 2023 in a general medicine office in the Santa Maria de Be querencia Health Centre, Toledo, Spain, which has a list of 2,000 patients > 14 years of age (in Spain, the general practitioners [GPs] care for people > 14 years of age, except for exceptions requested by the child's family and accepted by the GP).

2.2. Outcome of Interest
Know minimum incidence rates and the epidemiological of selected demographic and clinical features of new cases of covid-19.

2.3. Diagnosis of Covid-19
The diagnosis was performed with reverse transcriptase polymerase chain reaction oropharyngeal swab tests or antigen testing [8]. Performed in health services or at home.

2.4. Collected Variables
The following variables were collected: Age and sex -Chronic diseases (defined as "any alteration or deviation from normal that has one or more of the following characteristics: is permanent, leaves residual impairment, is caused by a non-reversible pathological alteration, requires special training of the patient for rehabilitation, and or can be expected to require a long period of control, observation or treatment" [9]. Social-occupancy class (according to the Registrar General's classification of occupations and social status code) [10, 11]. Complex family/ Problems in the family context based on the genogram (genogram is a schematic model of the structure and processes of a family, which included the family structure, life cycle and family relational patterns. It was understood that "complex" genograms present families with psychosocial problems) [12, 13].

Disease severity (classified according to:1) mild cases: clinical symptoms are mild and no manifestation of pneumonia can be found on images; 2) moderate cases: with symptoms such as fever and respiratory tract symptoms and the manifestation of pneumonia can be seen on the imaging tests; and 3) severe cases: respiratory distress, respiratory rate ≥ 30 breaths / min., pulse oxygen saturation ≤ 93% with room air at rest, arterial partial pressure of oxygen / oxygen concentration ≤ 300 mmHg.) [14]. to simplify comparison, moderate and severe cases were counted together; -Vaccination status against covid-19 at the date of acute infection: vaccinated with 2 doses of vaccine [15]. Vaccinated with first booster Vaccinated with fourth dose (second booster) for fall-winter 2022 [16, 17].

2.5. Calculation of Minimum Incidence Rates
Incidence rate was calculated by dividing the number of cases of covid-19 infections in the follow-up time (from October 1, 2022 to October 1, 2023). Data on the incidence were extrapolated to the entire population attended in the consultation (N=2,000 people) [18].

2.6. Calculation of Rate Numerators
All patients who consulted in the GP office object of the study with acute covid-19 infection: Cases notified to the GP after a positive test at home, or diagnosed by the GP in health services, for the period October 2022 to October 2023 were included.

2.7. Calculation of Rate Denominators
The total number of patients assigned to the consultation (2000 people) was used as an approximation to the denominator of rates. The denominator data for some variables were taken from different previous studies carried out in the same population treated in that general medicine consultation: these previously published data were used for the prevalence of chronic diseases for social-occupancy class for problems in the family context and for those vaccinated with the third and fourth dose [19-25].

2.8. Ethical Issues
No personal data of the patients were used, but only group results, which were taken from the clinical history.

3. Results
76 cases of Covid-19 were included during the study period. The crude minimum incidence rate of covid-19 infections in general medicine for the entire population served (=> 14 years) for the period October 2022 to October 2023 was 3.8 cases per 100 x 12 months. By age groups it was highest in > = 65 years with 6.0%, followed by the rates in 49-64 years with 4.1%, in 14-64 years with 3.3%, in 14-48 years with 2.9%, and from 14-18 years with 0.8%. By sex, minimum incidence rate of covid-19 infections was higher in women versus men: 4.5% versus 2.9%. Regarding the selected psycho-socio variables, a rate of 3.4% was found in some type of labour specialization and 0.8% in people with Complex family/ Problems in the family context. In people with chronic diseases a rate of 3.3% was found. The moderate-severe severity of infection rate for the entire population was 0.1%. Regarding vaccination status, the highest rate was in vaccinated with first booster (3 doses) 4.1%, followed by the rate in not vaccinated 2.4%, in vaccinated with second booster (4 doses) 1.9%, and in vaccinated only with 1 dose and/or 2 doses 1.3%.

Table 1: Minimum Incidence Rates of Covid-19 Infections in General Medicine for the Period October 2022 to October 2023.

Variables	Covid-19 Cases N=76	Estimated Population Of Gp Office N=2.000	Minimum Incidence Rates Of Covid-19 X 12 Months
=> 14 years	76 (100)	2.000 (100)	3.8 cases per 100 people => 14 years x 12 months
> = 65 years	21 (28)	349 (17)	6.0 cases per 100 people > = 65 years x 12 months
14-64 years	55 (72)	1651 (83)	3.3 cases per 100 people of 14-65 years x 12 months
49-64 years	21 (28)	511 (26)	4.1 cases per 100 in people of 49-65 years x 12 months
14-48 years	34 (45)	1140 (57)	2.9 cases per 100 people of 14-49 years x 12 months
14-18 years	1 (1)	120 (6)	0.8 cases per 100 people of 14-18 years x 12 months
Women	48 (63)	1060 (53)	4.5 cases per 100 women x 12 months
Men	28 (37)	940 (47)	2.9 cases per 100 men x 12 months
Social-occupancy class of patients (people with some type of labour specialization)	31 (41)	899 (45)	3.4 cases per 100 people with some type of labour specialization x 12 months
Complex family/ Problems in the family context	5 (7)	618 (31)	0.8 cases per 100 people with Complex family/ Problems in the family context x 12 months
Chronic diseases	48 (63)	1459 (73)	3.3 cases per 100 people with Chronic diseases x 12 months
Moderate-severe severity of infection	2 (3)	2000 (100)	0.1 cases per 100 with Moderate-severe severity of infection in people x 12 months
Covid-19 in vaccinated only with 1 dose and/or 2 doses	12 (16)	938 (47)	1.3 cases per 100 people vaccinated only with 1 dose and/or 2 doses x 12 months
Covid-19 in vaccinated with booster (3 doses)	42 (55)	1.021 (51)	4.1 cases per 100 people vaccinated with 3 doses x 12 months
Covid-19 in vaccinated with second booster (4 doses)	21 (28)	1.100 (55)	1.9 cases per 100 people vaccinated with 4 doses x 12 months
Covid-19 in not vaccinated	1 (1)	41 (2)	2.4 cases per 100 people not vaccinated x 12 months

( ): Denotes percentages

4. Discussion

Main Findings: The main findings were:
1. A crude minimum incidence rate of covid-19 infections in general medicine is found for the entire population served (=> 14 years) for the period October 2022 to October 2023 of 3.8 cases per 100 x 12 months which is a figure to consider. That indicates that in the endemic phase there are still a non-negligible number of cases.
2. The minimum incidence rate of covid-19 infections in the study period considered endemic (not pandemic/ epidemic) was progressively higher according to older age groups, with the highest figure in > = 65 years with 6.0 %.
3. The minimum incidence rate of covid-19 infections was higher in women vs. men: 4.5% vs. 2.9%.
4. Regarding vaccination status, the highest rate was in vaccinated with first booster (3 doses) 4.1%. This data,

which may seem shocking, is explained by the fact that the vast majority of the population was vaccinated with the first booster (3 doses). It is in this majority of people where the majority of infections will occur over time.

4.1 Comparison with Other Studies

There is currently a situation of "darkness" about how covid-19 will develop in the coming months, due to a lack of epidemiological information. To this we must add that in part the effectiveness of the vaccine is not yet fully understood, with re-infections present, and that there is waning immunity and the pressures that drive waves of infection are an enigma. Thus, although severe covid-19 is currently rare, populations remain vulnerable to future waves of re-infection with emerging SARS-CoV-2 variants despite high vaccination and infection rates [26].

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Ciatation: Turabian, J, L., (2023). Mínimum Incidente Rates of Covid-19 Infections in The Endemic Period from October 2022 To October 2023, In A General Medicine Office, In Toledo (Spain). Jornal of Epidimology and public health. 1(1), 1-6.

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The emergency of the covid-19 pandemic is over, but the virus continues to circulate. And it won't stop doing so in the near future. Given that covid-19 cases have stopped being measured in the general population and in many countries such as Spain, reports on all detected cases have stopped being published to focus on an estimate made with data reported by some health centres and the hospitals (the same method that has been used for the flu for years), how do we know the incidence rates? In many countries, statistics are available on cases admitted to hospitals. But their data are questionable for making comparisons, since the criteria for admission are now much laxer than in the pandemic era, since the capacity to care for patients is greater [5].

The situation of lack of population epidemiological data may also be common in other diseases. In certain environments, the incidence rates of a health problem are difficult to obtain for different reasons, both in determining the numerator (such as when clinical information is missing, lack of infrastructure, laboratory capacity, etc.), and in determining the denominator (for example, complex urban environment where hospitals act as a primary care level). To fill this gap, in these cases, we speak of estimation of the "minimum" incidence [27].

They are called "minimum incidence rates" when the estimates do not necessarily cover the entire population [7]. The concept of "minimum incidence/prevalence" has been used with some frequency in other studies [28-38]. Registries in general practice are key sources for morbidity estimates, especially if all people are registered in a general practice and if GP is the gatekeeper of health care; So, diagnoses from medical specialists and other health care providers will also be known by the GP [39, 40]. This is the case in Spain, general practitioners (GPs) are the gateway for all patients to the system, and each person is assigned a family doctor. In this way, data on covid-19 cases in general medicine consultations can be equated to "minimal incidence" rates [39].

An incidence of 137.3 cases per 100,000 population has been published for the Spanish population, based on the estimate made with data reported by some selected health centres and hospitals, for the period from August 28 to September 3, 2023 (0.14 per 100 inhabitants), slightly above the peak of December 2022. The highest rates are observed in the groups of children under four years of age and adults over 64 years of age. The hospitalization rate for covid-19, stands at 3 cases per 100,000 inhabitants (0.003%), with fluctuations increasing from the previous weeks (0.52 cases per 100,000 inhabitants). Among hospitalized patients, the highest rates are observed in the group of those over 79 years of age. The predominant variants in recent weeks have been XBB.1.5 (29%), BA.2.75 (14%) and %) and BQ.1 (29%) [5- 41].

Our study, finds a crude minimum incidence rate of covid-19 infections in general medicine for the entire population served (=>14 years) and for the period October 2022 to October 2023 of 3.8%. This data compared to the official figures in Spain [5- 41]. With an estimated average of 0.07% weekly x 48 weeks, corresponds to 3.4%, a figure slightly lower than the 3.8% in our study.
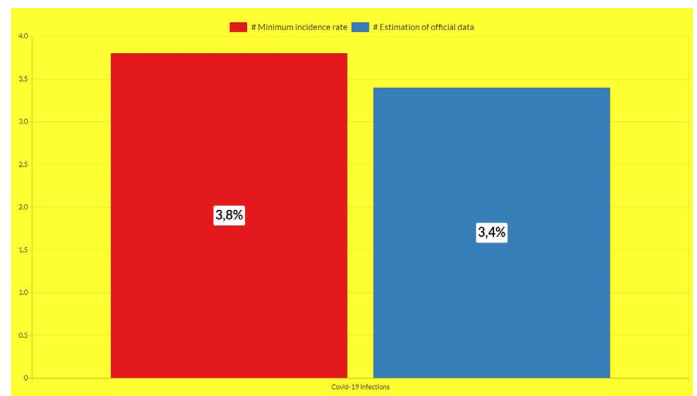

Figure 1: Comparison of Minimum Incidence Rate of Covid-19 Infection in General Medicine with Estimate from Official Data in Spain, For the Period October 2022 To October 2023.

This implies a moderate under-registration in the officially sentinel surveillance system with sample data from selected centres. It must be considered that our study shows a minimal incidence, since there will be sick people who do not take a test, and who, even if they are positive at home, do not report it to the GP [6].

On the other hand, our study also coincides with official data with a higher rate in adults over 64 years of age, and in that the rate of cases with moderate-severe severity of infection for the entire population (which indicates cases admitted to hospital plus others of moderate-severe severity treated out-of-hospital) is low; but here there is a significant under-registration; the rate was 0.1% in our study versus 0.003% weekly in a phase of peak cases, which could be estimated on average at 0.0002% weekly x 48 weeks, which corresponds to 0.001% in official data, which represents an important underreporting .
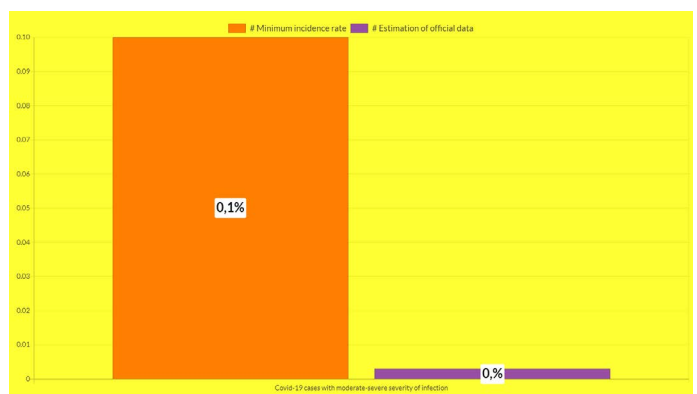

Figure 2: Comparison of Minimum Incidence Rate of Covid-19 With Moderate-Severe Infection in General Medicine with Estimate from Official Data in Spain, For the Period October 2022 To October 2023.

The figures published for different countries for September 13, 2023, when they exist, are mixed: from South Korea with 0.3%, to New Zealand, Italy, United States and the UK with figures around 0.1%, and even, Australia, Belgium or Czechia with figures around 0.01% (Biweekly cases); Based on these data, which are in a phase of peak cases, incidence figures for

12 months (48 weeks) can be estimated from 7.2% in South Korea to 2.4% in New Zealand, Italy, United States and the UK [42].

Other indicative data refer to surveys, such as the UK covid-19 Infection Survey, which published the positivity rate (the percentage of people who would have tested positive for covid-19 at a given time for the week ending the February 28, 2023; It must be taken into account that this is cumulative incidence or prevalence from the beginning of the pandemic; This is different from the incidence rate, which is a measure of only new positive cases in a given time period). This data showed in England, an estimated number of people testing positive for covid-19 of 2.38% of the population, in Wales, 2.14% of the population, in Northern Ireland 1.35% of the population, and in Scotland the 2.22% [43]. Thus, our data on minimum incidence rate of covid-19 infections in general medicine for the entire population served (=> 14 years) for the period October 2022 to October 2023 of 3.8%, are higher than those on prevalence or cumulative incidence reported.

4.2. Limitations and Strengths of the Study
1. The number of cases was small which may cause misinterpretation in certain subgroups analysed.
2. Asymptomatic cases that did not attend in GP consultation, as no systematic screening was done, may have been missed.
3. The study has the strength of it's longitudinally, characteristic of work in general medicine.

5. Conclusion
The minimum incidence rate of covid-19 infections in general medicine for the entire population served (=> 14 years) for the period October 2022 to October 2023 was 3.8%, in cases of moderate-severe severity 0.1%, in > = 65 years of 6.0%, and higher in women vs. men: 4.5% vs. 2.9%. These rates, despite being minimum incidence, indicate a moderate under-reporting with respect to the official data obtained from sample data from selected sentinel surveillance centres in relation to the crude rate for the entire population; and a greater under-reporting for moderate and severe cases. The figures of minimum incidence rate of covid-19 infections in general medicine shown in our study could be better indicators for tracking the SARS-CoV-2 virus than the official data which, when they exist, are partial or they do not refer to the entire population. The importance of minimum incidence data from general medicine consultations is suggested to approximate the incidence figures to the real data during the endemic phase of covid-19.

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