ORIGINAL ARTICLE

DOI: 10.4274/nkmj.galenos.023.83007
Nam Kem Med J 2023;11(4):354-362

An Assessment of COVID-19 Infectivity and Fatality: Meta-analysis Study

COVID-19 Enfektivitesi ve Fatalitesi Üzerine Bir Değerlendirme: Meta-analiz Çalışması

Evin KIRMIZITOPRAK[1], Tülay ORTABAĞ[2]

[1]Şanlıurfa Provincial Health Directorate, Public Hospital Services Directorate, Şanlıurfa, Turkey
[2]İstanbul Gedik University, Faculty of Nursing, Department of Public Health Nursing, İstanbul, Turkey

ABSTRACT

Aim: The effect size of the infectivity and fatality of the Coronavirus disease-2019 (COVID-19) virus, which shook the whole world, was examined using the meta-analysis method, which is considered to have high evidential value.

Materials and Methods: A comprehensive literature review (PubMed, Medline, Cochrane Library, Science Direct, ProQuest, Ulakbim, Ministry of Health, YÖK, WHO Global Index) was conducted between December 2019, the date of COVID-19 virus's first appearance in the world, and December 2020. Selection criteria for the study were determined. Twenty-one studies that met the criteria were included. The analyzed articles were coded by two independent coders, and the methodological quality of the studies to be included in the research was evaluated using the "Jadad score" and the "Newcastle Ottawa Criterion". Studies of medium and high quality were included in the study. Three versions of the Comprehensive Meta-Analysis program were used to analyze the data.

Results: The effect size on COVID-19 transmission and mortality was calculated as d=0.092 (p=0.000). According to Cohen (1988), studies have high effect sizes and are heterogeneous. According to the results of the moderator analysis investigating the heterogeneity of subgroup data, age, gender, clinical findings and comorbidity were found to be moderators for the mean effect size (p<0.05). In this context, demographic characteristics, clinical picture and comorbidity, as well as COVID-19 transmissibility and mortality rate, were determined to be significant and effective.

Conclusion: Due to the fact that it is a study covering the first year of the pandemic using the meta-analysis method in the field of nursing in global public health problems such as pandemics, it is thought that it will guide the studies to be done by using a wider time period and adding studies conducted in wider age categories and in different countries.

Keywords: COVID-19, infectivity, fatality, Coronavirus, meta-analysis

ÖZ

Amaç: Kanıta dayalı çalışmalar arasında en yüksek seviyede yer alan meta analiz yöntemi kullanılarak yürütülen bu çalışma, tüm dünyayı sarsan Koronavirüs hastalığı-2019 (COVID-19) virüsünün enfektivitesi ve fatalitesinin etki büyüklüğünü incelemektir.

Gereç ve Yöntem: COVID-19'un dünyada ilk görüldüğü tarih olarak ifade edilen Aralık 2019 ile Aralık 2020 zaman dilimleri arasında yapılan kapsamlı bir literatür taraması (PubMed, Medline, Cochrane Library, Science Direct, ProQuest, Ulakbim, Sağlık Bakanlığı, YÖK, WHO Global İndex) gerçekleştirildi. Çalışma için seçme kriterleri belirlendi. Çalışmaya seçme kriterlerine uyan 21 çalışma dahil edildi. Araştırmada analiz edilen makaleler, birbirinden bağımsız iki kodlayıcı tarafından kodlanarak, araştırmaya dahil edilecek çalışmaların metodolojik kalitesi "Jadad skoru" ve "Newcastle Ottawa Ölçütü" kullanılarak değerlendirildi. Araştırmaya orta ve yüksek kalitedeki çalışmalar dahil edildi. Verileri analiz etmek için Comprehensive Meta Analysis programının üç sürümü kullanıldı.

Bulgular: COVID-19 enfektivite ve fatalitesi üzerine yapılan çalışmamızın etki büyüklüğü d=0,092 (p=0,000) olarak hesaplandı. Cohen'e (1988) göre araştırmalar yüksek etki büyüklüğüne sahip ve heterojen yapıda bulundu. Heterojeniteyi araştırmak için yapılan alt grup verilerine ait moderatör analizi sonucuna göre, yaş, cinsiyet, klinik bulgu ve komorbiditenin ortalama etki büyüklüğü için bir moderatör olduğu (p<0,05) saptandı. Bu bağlamda COVID-19 enfektivite ve fatalitesinin demografik özellikler, klinik tablo ve komorbidite ile anlamlı ve etkili olduğu saptandı.

Address for Correspondence: Evin KIRMIZITOPRAK MD, Şanlıurfa Provincial Health Directorate, Public Hospital Services Directorate, Şanlıurfa, Turkey
Phone: +90 505 220 34 56 **E-mail:** evinkirmizitoprak@hotmail.com **ORCID ID:** orcid.org/0000-0002-6342-3751
Received: 18.08.2023 **Accepted**: 28.09.2023

Sonuç: Pandemi gibi global halk sağlığı sorunlarında hemşirelik alanında meta-analiz yöntemi kullanılarak yapılan ve pandeminin ilk yılını kapsayan bir çalışma olması nedeniyle, daha geniş bir zaman dilimi kullanılarak, geniş yaş kategorilerinde ve daha farklı ülkelerde yapılan çalışmaların da eklenmesiyle yapılacak çalışmalar için yol gösterici olacağı düşünülmektedir.

Anahtar Kelimeler: COVID-19, enfektivite, fatalite, Koronavirüs, meta-analiz

INTRODUCTION

The struggle with the fluctuations of the coronavirus disease-2019 (COVID-19), which has affected the whole world and has come to the fore with its viral variants, continues. Considering the frequent occurrence of COVID-19, which entered our lives as a pandemic, the increase in hospitalization rates due to the need for medical care, and its fatality, it has been determined to be a global public health problem. In the statement made by World Health Organization (WHO) on December 31st, 2019, it was announced that there was a cluster of cases belonging to pneumonia cases of unknown cause. As a result of the investigations, it was announced that these clusters of cases were caused by viruses, this virus was named Severe acute respiratory syndrome-Coronavirus-2 (SARS-CoV-2) and the disease was named COVID-19. COVID-19 has existed in 210 countries, regardless of continent, in a one-year period since its official recognition, causing more than 1.7 million deaths and over 79 million positive cases[1].

The virus, which enters the body by respiratory or mucosal route after contact with infected areas, presents with a wide range of clinical manifestations, from mild infection to life-threatening severe clinical manifestations. This virus, which basically causes respiratory system infection, has both acute and long-term effects on mental health, as well as threatening physical health in humans. Although it is currently in the normalization process with the epidemic, the virus, which has survived by undergoing many mutations over time, continues to arouse feelings of fear, stress and anxiety in individuals[2-4].

The rapid spread of the virus all over the world after its appearance shows that the rate of contagion is very high. Moreover, Considering the increased fatality by passing a large number of mutations, it was declared as a COVID-19 pandemic by the WHO on March 11, 2020[5].

From the time the virus started the pandemic until December 2022, that is, in a period of about 3 years, it infected more than 655 million people in the world and caused the death of more than 6.6 million people, creating a public health problem at the international level. It has been observed that the numbers of COVID-19 cases and deaths have increased due to reasons such as the virus, which transmits rapidly and causes death by disease, frequently mutates, there is no proven definitive treatment yet, individuals do not show sufficient sensitivity in vaccination, and individuals do not use personal protectors in social areas. The biggest risk groups for this disease consisted of individuals over 65 years of age, those with comorbid diseases, healthcare workers, pregnant women, and children[1,2,6-8].

In this study, it is aimed to evaluate the infectivity and fatality of the COVID-19 pandemic in a one-year period from the moment it emerged, using the meta-analysis method, and to determine the public health approaches for prevention.

Purpose of the Research

To evaluate the infectivity and fatality of the COVID-19 pandemic in a one-year period from the time of its emergence, to summarize the prevalence and fatality of COVID-19, to evaluate the fatality in infected cases.

MATERIALS AND METHODS

Research Protocol and Registration

As a research protocol, it was created by the PRISMA steps, consisting of evidence-based items including reporting items used for systematic review and meta-analysis studies, and reported in the International Prospective Systematic Review Registry database (ID: CRD 42021255449).

Eligibility Criteria

In our study, studies within a period of 1 year from the date of first appearance of the cases were included by making a time limit. Retrospective descriptive and cohort studies were evaluated in the study. Moreover, observational studies were included to evaluate infectivity and fatality. The language of the article was determined as English and Turkish. We included posts from December 1st, 2019 to December 31st, 2020. Studies conducted in languages other than those specified, articles that did not specify specific data, articles and letters containing opinions, and studies that reported cases with missing data were excluded.

Data Sources and Search Strategy

PubMed, Medline, Cochrane Library, Science Direct, YÖK Thesis, Ulakbim, Ministry of Health, Who Global Index were used as databases. MeSH (Medical Subjects Headings) content was used in structuring the keywords in the search. In databases; "Covid-19 and infectivity", "Covid-19 and fatality", "New type coronavirus and infectivity", "New type coronavirus and fatality", "SARS-Cov-2 and infectivity", "SARS-Cov-2 and

fatality" ", "Coronavirus and infectivity", "Coronavirus and fatality" structures were scanned in both languages.

Study Selection

In the first search, the title and summary of the studies were scanned first. The full texts of the articles to be evaluated were examined, taking into account the determined criteria (inclusion and exclusion) (PRISMA flow diagram) (Figure 1). Only one study was counted from the same studies. Studies without numerical data were not included in the study.

Data Collection Process

A coding form created by the researchers was developed. This form includes three main headings. These are the identity of the study (type of study reviewed, country of study, year and date of publication, author(s), and sample size of the study), characteristics of the study (clinical characteristics (e.g., high fever, cough), number of deaths, comorbidities), and study data (effect size, Sd, Q, N, P, T2, I2, and Z.), which were filled in independently by two researchers. The two encoders were then brought together to perform cross-checks. Numerical data were reviewed at least twice in order to avoid duplicate articles or duplicate information and to avoid errors during coding. In this way, coding reliability was ensured, and intercoder compliance reliability was also calculated using the Cohen's Kappa statistical method. The result of Cohen's Kappa statistic was obtained as confidence (κ=0.95). Jadad score and Newcastle Ottawa Criterion were used to evaluate the quality of the studies determined to be used in the research.

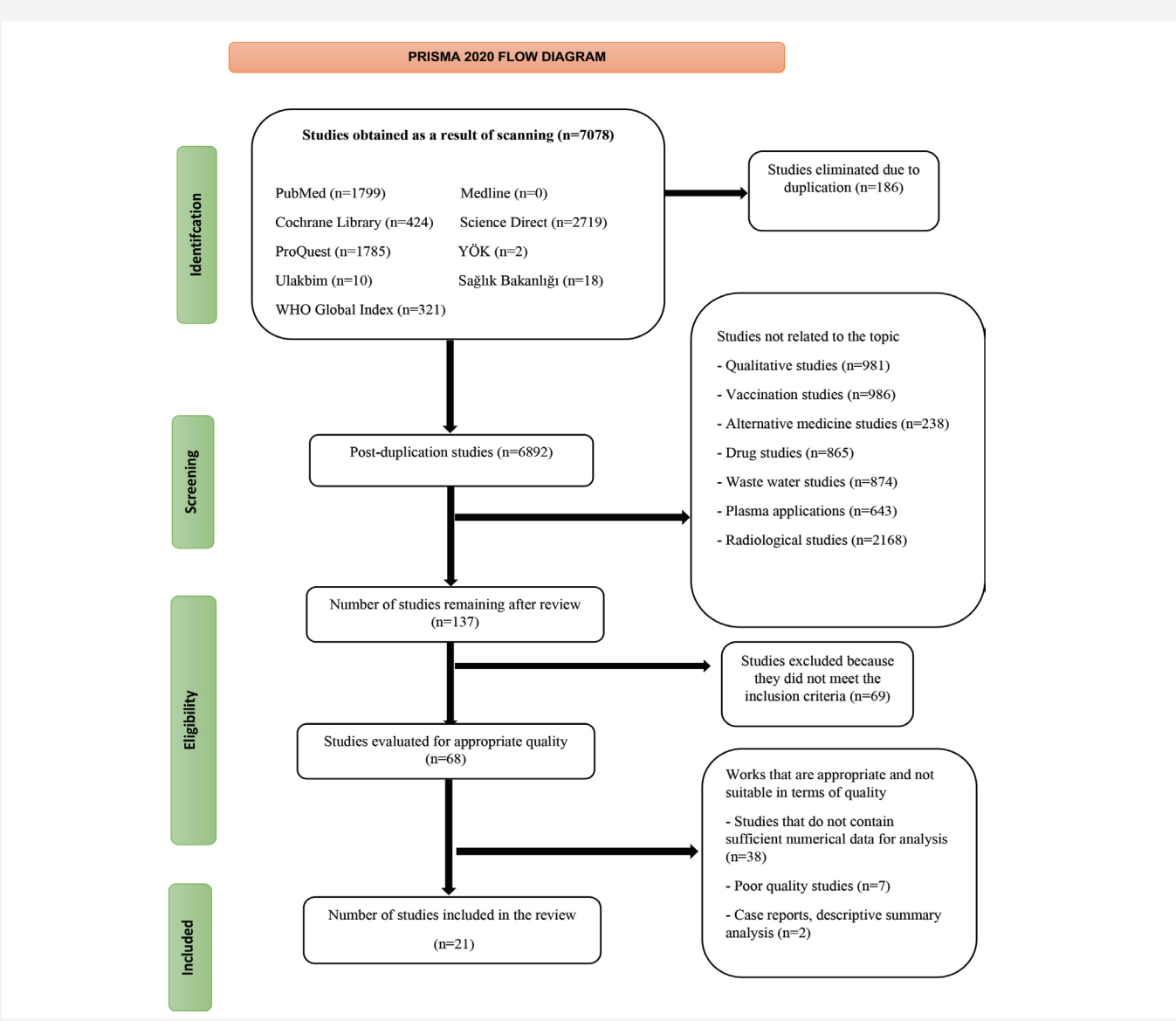

Figure 1. PRISMA 2020 flow diagram

Publication bias was evaluated using the funnel plot graph, as well as Fail-Safe N and Begg and Mazumdar's Kendall's Tau coefficient (p>0.05). A random effects model was used to calculate the 95% confidence interval (CI).

Statistical Analysis

Due to the unit mismatch of the studies accepted for the study, all data were converted into a standard measurement for the relevant variable and a common language was used. Percentages and means±standard deviations (SD) were calculated to describe the distributions of the categorical and continuous variables, respectively. Weighted averages and SDs were studied, since information on all cases included in the analysis was not included. Descriptive data were calculated using licensed Statistical Package for the Social Sciences statistics version 24. Microsoft Office Excel program was used to create the coding tables of the data. For statistical analysis, the Comprehensive Meta-Analysis (CMA) licensed version (CMA version 3) package program used in meta-analysis studies was utilized. The pooled prevalences with 95% CI were attempted to be summarized using weighted effect sizes for each grouped study variable using a random effects model. Weighting was done by considering sample sizes of systematic studies and meta-analysis studies.

Cochran's heterogeneity measures including Q statistics, I^2 index, p value, Tau and Fail-Safe N tests were calculated and reported. We conducted moderator analyses of data on demographic variables (age and gender), clinical findings, and comorbidity.

RESULTS

Selection of Evaluated Studies

A total of 7078 studies were found in the literature review using the search strategy. Considering the exclusion criteria, a total of 21 articles were included in the study. Considering the research design of these studies, 13 of them were in descriptive analysis and 8 of them were in cohort structure. The characteristics and methodological quality scores of the included studies are shown in Table 1.

In our research, the studies published between December 2019, when the COVID-19 infection emerged, and December 2020 were handled with a time limit. Most of the studies evaluated were performed in China (95.0%). One of them took place in Italy. Studies with moderate and high methodological quality assessments were included in the study (Jadad >2, Newcastle Ottawa Criterion ≥5). The characteristics of the included studies, the first authors, and the findings of the methodological

Table 1. Characteristics of studies included in the analysis and their methodological quality scores

First author	Release date (D/M)	Data source country	Research design	Size of study (n)	Jadad score (0-5)	Newcastle Ottawa Criterion (0-9)
Du et al.[13]	01/06	China	Descriptive research	85	2	-
Chen et al.[11]	21/02	China	Descriptive research	99	2	-
Zhou et al.[29]	28/03	China	Cohort study	191	-	7
Wang et al.[21]	17/03	China	Descriptive research	138	3	-
Onder et al.[20]	23/03	Italy	Descriptive research	355	2	-
Yang et al.[25]	01/07	China	Cohort study	205	-	8
Hua et al.[18]	20/02	China	Descriptive research	44672	2	-
Wan et al.[22]	01/04	China	Descriptive research	135	2	-
Huang et al.[17]	15/02	China	Descriptive research	41	3	-
Liu et al.[19]	05/05	China	Descriptive research	137	2	-
Guan et al.[16]	28/02	China	Descriptive research	1099	2	-
Chu et al.[12]	06/04	China	Cohort study	54	-	7
Feng et al.[14]	01/06	China	Cohort study	476	-	8
Gao et al.[15]	10/04	China	Cohort study	43	-	5
Xu et al.[24]	01/04	China	Cohort study	50	-	5
Zhen et al.[28]	01/03	China	Cohort study	161	-	5
Xu et al.23	19/02	China	Descriptive research	62	2	-
Chen et al.[10]	01/05	China	Descriptive research	21	2	-
Zhang et al.[27]	01/07	China	Cohort study	140	-	8
Chang et al.[9]	01/03	China	Descriptive research	13	2	-
Yang et al.[26]	01/04	China	Descriptive research	52	2	-

quality score were given in detail. The descriptive data of the studies included in the research are shown in Table 1.

Findings of Descriptive Data

A total of 48,229 people, 51.9% of whom were targets, participated in 21 studies. In the evaluated studies, individuals over the age of 65 years constituted the majority of the participation (90%). The most common clinical findings were high fever (88.0%) and cough (64.5%). These are followed by other findings. The comorbidity status was evaluated, while hypertension was the first rank for chronic diseases, followed by liver diseases (3.8%) and diabetes (3.2%) (Table 2).

Findings of Demographic Variables

In 20 of the evaluated studies, only the mean age of the patients was given, and the mean age was found to be 52.4 years (95% CI: 0.52-0.19), like the mean age in the other study. In terms of gender distribution, 51.9% were male (95% CI: 0.04-0.18) (Table 2).

Findings of Clinical Data

There were 3 studies that did not include clinical findings. Studies that included clinical findings were analyzed among themselves. The most common findings were reported to be fever (88.0%, 95% CI: 0.43-0.16), cough (64.5%, 95% CI: 0.43-0.16) and burnout (40.0%, 95% CI: 0.04-0.23). Since all of the studies included in the study did not contain the same clinical findings, common clinical findings were evaluated (Table 3).

Findings of Comorbidity

Three studies were exempted from comorbidity assessment due to lack of data. Available data were analyzed among themselves. The most common chronic diseases were identified to be hypertension (6.9%, 95% CI: 0.03-0.14), chronic liver disease (3.8%, 95% CI: 0.02-0.19) and diabetes (3.2%, 95% CI: 0.05-0.23) (Table 4). Considering the degrees of freedom, when the evaluations made at the CI of 0.05 from the χ^2 critical values, the table showed that the study was heterogeneous; when compared to the Q statistics, the I^2 index also revealed the level of heterogeneity.

DISCUSSION

There are 21 studies with a sample size of 13-44,672 in the research. When the sample size of these studies included in the analysis was evaluated, it was seen that 52.4% of them studied with 100 people or more (n>100). There is information that the large sample size of the individual studies included in the meta-analysis narrows the CI. This subject is also examined in the funnel plot graph. The number of samples is important for the generalization of the results of meta-analysis studies and for guiding future studies. It is possible to say that the research subject is COVID-19, which creates a worldwide pandemic, and that the period determined for the study (studies within 1 year from the day of the pandemic) gives priority to treatment and prevention methods. For this reason, it is considered normal to have a limited number of studies in the relevant period[36,37].

Table 2. Findings of the descriptive data of the studies included in the analysis

Variable	Frequency	Percentage	Variable	Frequency	Percentage
Research design			**Sample size**		
Descriptive	13	61.9	n<100	10	47.6
Cohort	8	38.1	100<n<1,000	9	42.9
			n>1,000	2	9.5
Age			**Gender**		
n≤65	18	90.0	Man	25,062	51.9
n>65	2	10.0	Woman	23,167	48.1
Clinical findings*			**Comorbid diseases***		
Fire	18	88.0	Other diseases	10	8.7
Cough	18	64.5	Hypertension	15	6.9
Burnout	12	40.0	Chronic liver diseases	9	3.8
Anorexia	4	25.3	Diabetes	18	3.2
Dyspnea	15	23.3	Cardiovascular disease	17	2.6
Myalgia	16	19.2	Chronic kidney diseases	8	1.3
Headache	14	12.2	COPD	16	1.2
Diarrhea	17	7.5	Malignancies	13	0.9
Vomiting	10	4.6			

*It was determined that the criteria determined in the patients included in the studies were different from each other, and the criteria commonly used in the study were analyzed.
COPD: Chronic obstructive pulmonary disease

It was observed that the researchers used descriptive and cohort research techniques obtained by using existing registration systems. All data were quantitative as it was a retrospective study. No qualitative study was found on the specified dates. All studies included in the study were published in 2021 due to the time limitation. For this reason, we can say that the fact that the studies (20 studies) were carried out in China, the country where the pandemic was first seen, brings regional limitations to our research, since it will take time to see cases in other countries and to carry out studies in a limited time[9-29].

In the study, it was observed that the transmission was in both genders, while the rate of infection was higher in men than in women. The fact that the majority of the cases (90.0%) covered in the study were under 65 years of age indicates that the active population has a high spread of contagiousness, while it is known that most of the patients who died in the studies were men aged 60 years and over. However, there is a need for a detailed examination of the causes of death, taking into account all ages, genders and underlying comorbidities, and more studies with high levels of evidence.

While evaluating effect sizes in meta-analysis studies, many tests are used to test publication bias. The most used of these tests is the funnel plot chart. Since the funnel plot is a subjective evaluation, it is not considered sufficient on its own when evaluating publication bias. While evaluating publication bias in the study, other statistics were also evaluated.

When the fail-safe N statistics are examined, a total of 1482 reverse studies are needed in order to invalidate the meta-analysis results of the 21 studies included in the study. Since the number 1482 is very far from 21 and is a large number, we can say that there is no publication bias in our study based on

Table 3. Clinical characteristics of the study subjects

Variable	Number of studies (n)	Mean/prevalence (%)	95% CI[a]	n	SD	Q[b]	I^{2c}	t^{2d}	p
Fever	18	88.0	0.43-0.16	3,159	17	277,41	93.9	1,727	<0.001
Cough	18	64.5	0.43-0.16	3,159	17	277,41	93.9	1,727	<0.001
Burnout	12	40.0	0.04-0.23	2,333	11	242,955	95,472	2,341	<0.001
Anorexia	4	25.3	0.01-0.08	498	3	40,028	92.5	11,314	<0.001
Dyspnea	15	23.3	0.04-0.17	2,893	14	232,47	93.9	1,907	<0.001
Myalgia	16	19.3	0.04-0.17	2,814	15	263,49	94.3	2,080	<0.001
Headache	14	12.2	0.04-0.18	2,569	13	208,466	93.8	2,287	<0.001
Diarrhea	17	7.5	0.04-0.13	3,107	16	206,76	92.3	1,388	<0.001
Vomiting	10	4.6	0.04-0.27	2,224	9	238.118	96.2	2,540	<0.001

[a]95% CI=95% confidence interval.

[b]Cochran's Q statistic for heterogeneity.

[c]I2 index for the degree of heterogeneity.

[d]Tau-squared measure of heterogeneity.

CI: Confidence interval, SD: Standard deviation, COPD: Chronic obstructive pulmonary disease

Table 4. Comorbidities of the study subjects

Variable	Number of studies (n)	Mean/ prevalence (%)	95% CI[a]	n	SD	Q[b]	I^{2c}	t^{2d}	p
Other diseases	10	8.72	0.05-0.27	2,363	9	243,890	96.3	2,196	<0.001
Hypertension	15	6.9	0.03-0.14	4,7606	14	612,203	97.7	2,117	<0.001
Chronic liver diseases	9	3.8	0.02-0.19	2,030	8	130,656	93.9	2,444	<0.001
Diabetes	18	3.2	0.05-0.23	48,112	17	875,243	98.1	2,668	<0.001
Cardiovascular disease	17	2.6	0.05-0.22	48,091	16	862,062	98.1	2,676	<0.001
Chronic kidney diseases	8	1.3	0.04-0.23	2,396	7	182,104	96.2	1,795	<0.001
COPD	16	1.2	0.03-0.16	47,736	15	811,771	98.2	2,527	<0.001
Malignancies	13	0.9	0.08-0.36	47,685	12	855,631	98.6	2,698	<0.001

[a]95% CI=95% confidence interval.

[b]Cochran's Q statistic for heterogeneity.

[c]I2 index for the degree of heterogeneity.

[d]Tau-squared measure of heterogeneity.

CI: Confidence interval, SD: Standard deviation, COPD: Chronic obstructive pulmonary disease

the fail-safe N value. Publication bias was analyzed using Duval & Tweedie's trim and fill and Begg and Mazlumdar statistics. The value in Kendall's Tau diagram was found to be 0.18396, and the fact that this value is greater than 0.05 is another indication that there is no publication bias in our study. All statistics were aimed to obtain reliable results in the meta-analysis study. In addition to the fact that the results in meta-analysis studies are reliable, the number of publications to be included in the research is high, publication bias is the focus of the study in order to prevent only studies with statistically significant results from the analysis[30].

In this context, trying to reach all studies that meet the inclusion-exclusion criteria within the specified period of time by restricting the time of the research in order to exclude only the studies containing the desired results from the meta-analysis also explains the heterogeneity. The effect size (d=0.092, p=0.000) in the analysis of the studies included in the study by applying the random effects model, and the studies included in the meta-analysis according to Cohen's (1998) were found to have high effect size and statistical significance.

In the funnel plot, 2 studies diverging from the mean effect size were observed[20,26]. It is noteworthy that the first of the two studies that diverged was conducted on patients who were diagnosed with COVID-19 and died. In the other study, Yang et al.[26] evaluated 52 patients. In this single-center study, the death of 32 patients included in the evaluation explains the distance to the mean effect size. In 7 studies included in the analysis, fatality was not evaluated, but infectivity and clinical course. Due to the time limitation of the research, more and detailed studies are needed in this area.

The first year of the disease was important for the development of diagnosis and treatment protocols. For this reason, many studies were followed, including laboratory, imaging, clinical findings, mutations due to the evolutionary change of the disease, and critical information that should be carefully examined in a new pandemic process. This research has been studied to guide new studies by summarizing the data on infectivity and fatality by including clinical data and comorbidities of cases with a diagnosis of COVID-19 published from the beginning of the pandemic to the first year of the epidemic. A total of 21 studies involving 48,229 patients were included. Since data with high heterogeneity were obtained in the analyses, meta-regression data were also included.

The fact that the mean age of the studies included in the analysis was 52.4 years can be called a limitation of the study. It can be said that the number of studies on individuals in the advanced age group is insufficient and this situation may affect the results of the analysis. It is similar to other studies reporting that men (51.9%) are the most frequently infected gender. In the studies conducted for this condition, it was explained that men lack the protection of the X chromosome and estrogen hormone. This datum was not limited to the studies included in the meta-analysis, but was consistent with other studies[31-33].

The data of the clinical findings of the studies were evaluated and a high level of significance was determined. While common clinical findings and incidence are similar to those in other studies, the most common ones are fever, cough and burnout. It was also found to be significant in the subgroup analyses[34].

When the comorbidity data were evaluated, it was observed that some of the patients had more than one chronic disease. The most common complication was hypertension. This is followed by liver disease and diabetes. We can say that the low mean age of the patients evaluated in our study affected the analysis of comorbidity status. Considering the basic limitations of our research, comorbidity was among the findings obtained in the study. In order to evaluate this situation in more detail, studies with high evidence value examining the relationship between COVID-19 and comorbidity should be included by keeping the time limitation of the research wide[35].

Study Limitations

There are some limitations of this research. The number of studies included in the study is small. Since most of the studies were conducted in China, it would be better to include them in studies conducted in a wider geography, given the difference in infectivity and fatality in other countries. Studies published in English or Turkish are included in the search criteria. It is important to expand the language and time limit in order to gain more comprehensive information on the subject.

CONCLUSION

There is a great increase in the infectivity and fatality of COVID-19 disease in the first year of its emergence. This disease has affected the whole world. When infectivity and fatality were evaluated by gender, it was observed that men were exposed to more than women. This disease, which is known to be more deadly in advanced ages, was observed to have affected middle age at the time of the study. All of the studies are retrospective and differ in terms of methodological quality. It has been determined that the most common clinical features in COVID-19 cases are high fever and cough, which are the general symptoms of viral infections. It has become important in chronic diseases in patients infected with COVID-19. The most common chronic diseases encountered in the studies include hypertension, chronic liver diseases and diabetes. It can be said that gender, the clinical picture of the disease and the presence of comorbidity have a significant effect on the infectivity and fatality of the epidemic. Considering that the majority of the studies were conducted in China and the

difference in infectivity and fatality in other countries, there is a need for further studies conducted in a wider geography.

Ethics

Ethics Committee Approval: Since the research is not a study conducted on living things, ethical permission was not obtained since there was no situation that would constitute an ethical violation. Additionally, the studies used in the research It was selected from studies with available full texts and is located in the reference section.

Informed Consent: Meta-analysis study.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Design: E.K., T.O., Data Collection or Processing: E.K., Analysis or Interpretation: E.K., T.O., Literature Search: E.K., Writing: E.K., T.O.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

REFERENCES

1. World Health Organization. Last Accessed Date: Agust, 2021. Available from: https://www.who.int/publications/m/item/weekly-epidemiological-update---29-december-2020
2. Aşkın R, Bozkurt Y, Zeybek Z. Covid-19 Pandemisi: Psikolojik etkileri ve Terapötik Müdahaleler. İstanbul Ticaret Üniversitesi Sosyal Bilimler Dergisi. 2020;19(Özel Sayı):304-18.
3. Rajkumar RP. COVID-19 and mental health: A review of the existing literature. Asian J Psychiatr. 2020;52:102066.
4. Kang I, Gunasekera RS, Galbadage T, Peterson BM, Gunasekera RS. Does COVID-19 Spread Through Droplets Alone? Front Public Health. 2020;8:163.
5. Ministry of Health of the republic of Turkey. Last Accessed Date: April 29, 2022. Available from: https://covid19.saglik.gov.tr/
6. Wang L, Shi Y, Xiao T, Fu J, Feng X, Mu D, et al. Chinese expert consensus on the perinatal and neonatal management for the prevention and control of the 2019 novel coronavirus infection (First edition). Ann Transl Med. 2020;8:47.
7. Worldometers. Covid-19 Coronavirus Pandemic. Last Accessed Date: 11 December 2021. Available from: https://www.worldometers.info/coronavirus/#countries
8. Yang J, Zheng Y, Gou X, Pu K, Chen Z, Guo Q, et al. Prevalence of comorbidities and its effects in patients infected with SARS-CoV-2: a systematic review and meta-analysis. Int J Infect Dis. 2020;94:91-5.
9. Chang D, Lin M, Wei L, Xie L, Zhu G, Dela Cruz CS, et al. Epidemiologic and Clinical Characteristics of Novel Coronavirus Infections Involving 13 Patients Outside Wuhan, China. JAMA. 2020;323:1092-3.
10. Chen G, Wu D, Guo W, Cao Y, Huang D, Wang H, et al. Clinical and immunological features of severe and moderate coronavirus disease 2019. J Clin Invest. 2020;130:2620-9.
11. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet. 2020;395:507-13.
12. Chu J, Yang N, Wei Y, Yue H, Zhang F, Zhao J, et al. Clinical characteristics of 54 medical staff with COVID-19: A retrospective study in a single center in Wuhan, China. J Med Virol. 2020;92: 807-13.
13. Du Y, Tu L, Zhu P, Mu M, Wang R, Yang P, et al. Clinical Features of 85 Fatal Cases of COVID-19 from Wuhan. A Retrospective Observational Study. Am J Respir Crit Care Med. 2020;201:1372-9.
14. Feng Y, Ling Y, Bai T, Xie Y, Huang J, Li J, et al. COVID-19 with different severities: A multicenter study of clinical features. Am J Respir Crit Care Med. 2020;201:1380-8.
15. Gao Y, Li T, Han M, Li X, Wu D, Xu Y, et al. Diagnostic utility of clinical laboratory data determinations for patients with the severe COVID-19. J Med Virol. 2020;92:791-6.
16. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med. 2020;382:1708-20.
17. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020;395:497-506.
18. Hua W, Xiaofeng L, Zhenqiang B, Jun R, Ban W, Liming L. [The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China]. Zhonghua Liu Xing Bing Xue Za Zhi. 2020;41:145-151. Available from: https://rs.yiigle.com/cmaid/1184694
19. Liu K, Fang YY, Deng Y, Liu W, Wang MF, Ma JP, et al. Clinical characteristics of novel coronavirus cases in tertiary hospitals in Hubei Province. Chin Med J (Engl). 2020;133:1025-31.
20. Onder G, Rezza G, Brusaferro S. Case-Fatality Rate and Characteristics of Patients Dying in Relation to COVID-19 in Italy. JAMA. 2020;323:1775-6.
21. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. JAMA. 2020;323:1061-9.
22. Wan S, Xiang Y, Fang W, Zheng Y, Li B, Hu Y, et al. Clinical features and treatment of COVID-19 patients in northeast Chongqing. J Med Virol. 2020;92:797-806.
23. Xu XW, Wu XX, Jiang XG, Xu KJ, Ying LJ, Ma CL, et al. Clinical findings in a group of patients infected with the 2019 novel coronavirus (SARS-Cov-2) outside of Wuhan, China: retrospective case series. BMJ. 2020;368:606.
24. Xu YH, Dong JH, An WM, Lv XY, Yin XP, Zhang JZ, et al. Clinical and computed tomographic imaging features of novel coronavirus pneumonia caused by SARS-CoV-2. J Infect. 2020;80:394-400.
25. Yang K, Sheng Y, Huang C, Jin Y, Xiong N, Jiang K, et al. Clinical characteristics, outcomes, and risk factors for mortality in patients with cancer and COVID-19 in Hubei, China: a multicentre, retrospective, cohort study. Lancet Oncol. 2020;21:904-13.
26. Yang X, Yu Y, Xu J, Shu H, Xia J, Liu H, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. Lancet Respir Med. 2020;8:475-81.
27. Zhang JJ, Dong X, Cao YY, Yuan YD, Yang YB, Yan YQ, et al. Clinical characteristics of 140 patients infected with SARS-CoV-2 in Wuhan, China. Allergy. 2020;75:1730-41.
28. Zheng F, Tang W, Li H, Huang YX, Xie YL, Zhou ZG. Clinical characteristics of 161 cases of corona virus disease 2019 (COVID-19) in Changsha. Eur Rev Med Pharmacol Sci. 2020;24:3404-10.
29. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. Lancet. 2020;395:1054-62.
30. Dinçer S. Eğitim Bilimlerinde Uygulamalı Meta-Analiz Araştırma - İnceleme Pegem Akademi Yayıncılık, 2014. Available from: https://pegem.net/urun/Egitim-Bilimlerinde-Uygulamali-Meta-Analiz/60764
31. Gebhard C, Regitz-Zagrosek V, Neuhauser HK, Morgan R, Klein SL. Impact of sex and gender on COVID-19 outcomes in Europe. Biol Sex Differ. 2020;11:29.

32. Jin JM, Bai P, He W, Wu F, Liu XF, Han DM, et al. Gender Differences in Patients With COVID-19: Focus on Severity and Mortality. Front Public Health. 2020;8:152.

33. Nikpouraghdam M, Jalali Farahani A, Alishiri G, Heydari S, Ebrahimnia M, Samadinia H, et al. Epidemiological characteristics of coronavirus disease 2019 (COVID-19) patients in IRAN: A single center study. J Clin Virol. 2020;127:104378.

34. Karaca B. Clinical Findings of ¬ e COVID-19 in the Adult Group. J Biotechnol and Strategic Health Res. 2020;1(Suppl):85-90.

35. Teker GA, Emecen AN, Girgin S, Şimşek Keskin H, Şiyve N, Sezgin E, ve ark. Türkiye'de Bir Üniversite Hastanesinde COVID-19 Olgularının Epidemiyolojik Özellikleri. Klimik Dergisi. 2021;34:61-8.

36. Prisma (N.D.). Retrieved January 23, 2023. Available from: https://www.prisma-statement.org//

37. Ried K. Interpreting and understanding meta-analysis graphs--a practical guide. Aust Fam Physician. 2006;35:635-8.