

Severity and Risk of Death Due to COVID 19

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Abstract:

A novel SARS-CoV2 virus appeared since December 2019 and triggering the Corona virus disease (2019-nCoV or COVID-19). Usually the symptoms begin as mild, with only fever, cough, and occasional dyspnea. The severe symptoms such as

pneumonitis, and acute respiratory distress syndrome (ARDS), may occur 5-8 days into COVID-19 illness in a minority of patients. **Method:** for this narrative review, more than 25 related scientific articles and reports about COVID-19 were used from different databases (e.g., PubMed, Google Scholar, and Web of Science) using keywords such as SARS-CoV2, COVID-19, Mortality, and CO-morbidities. **Results** The results of this review reported that aged people are more vulnerable to severe pattern of COVID-19 disease than people younger than 50 years; probably because of health issues and comorbidities in that population group. Male more than female affected by COVID-19. On the other hand, children might be less probable to infected or might show mild symptoms if infected. The small percentage of current smokers infected with COVID-19 compared with the actual percentage of smokers (50.5%) in China are unlikely to be related with the incidence, severity, or mortality rate of COVID-19. The poorer clinical outcome in COVID-19 infected patients may have related to the presence and number of co morbidities especially hypertension, diabetes and cardiovascular diseases. The direct SARS-COV2 infection of liver cells might be the cause of liver damage but might be related to other reasons such as systemic inflammation and drug toxicity. The data suggested that liver damage is more predominant in severe cases especially with pre-existing liver diseases. patients with cancer might be more prone to COVID 19 due to their immunocompromised status but whether or not they have high risk of poor prognoses and sever event not fully established.

Key words: SARS-CoV2, COVID-19, Mortality, and CO-morbidities

شدة وخطر الوفاة بسبب COVID 19

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الخلاصة:

ظهر فيروس SARS-CoV2 الجديد منذ ديسمبر 2019 وأدى إلى الإصابة بمرض فيروس كورونا (nCoV-2019 أو COVID-19). عادة ما تبدأ الأعراض على أنها خفيفة، مع الحمى والسعال وضيق التنفس العرضي فقط. قد تحدث الأعراض الشديدة بما في ذلك ضيق التنفس والالتهاب الرئوي ومتلازمة الضائقة التنفسية الحادة بعد 5-8 أيام من الإصابة بمرض COVID-19 لدى القليل من المرضى. بشكل عام، يكون كبار السن أكثر عرضة للإصابة بمرض COVID-19 من مرض COVID-19 من الأشخاص الذين تقل أعمارهم عن 50 عامًا؛ ربما بسبب المشاكل الصحية والأمراض المصاحبة في تلك المجموعة. يتأثر الذكور أكثر من الإناث بـ COVID-19. من ناحية أخرى، قد يكون الأطفال أقل عرضة للإصابة أو قد تظهر عليهم أعراض خفيفة إذا أصيبوا. من غير المحتمل أن تكون النسبة المئوية الصغيرة

للمدخنين الحاليين مقارنة مع النسبة المئوية الفعلية للمدخنين في الصين (0.55 %) مرتبطة بالحدوث أو الشدة أو معدل الوفيات لـ COVID-19. النتائج المتفارقة للمرضى المصابون بمرض COVID-19 ربما تتعلق بوجود وعدد الأمراض المصاحبة وخصوصاً ارتفاع ضغط الدم والسكري وأمراض القلب والأوعية الدموية. قد تكون العدوى المباشرة لـ SARS-CoV2 لخلايا الكبد هي سبب تلف الكبد ولكن قد تكون أيضاً مرتبطة بأسباب أخرى مثل الالتهاب وسمية الأدوية. أشارت البيانات إلى أن تلف الكبد أكثر شيوعاً في الحالات الشديدة منها في الحالات الخفيفة خاصة مع أمراض الكبد الموجودة مسبقاً. قد يكون مرضى السرطان أكثر عرضة للإصابة بـ COVID-19 بسبب نقص المناعة، ولكن لم يتم الإثبات بالكامل فيما إذا كانوا معرضين لخطر الإصابة أو تفاقم الحالة.

الكلمات المفتاحية: COVID 19 ، الأمراض المصاحبة ، أمراض الكبد ، السرطان

Introduction

Corona viruses are enveloped RNA viruses from the family of Coronaviridae, are mostly distributed in animals and humans [1]. In the past two decades the transmission of the two corona viruses, Severe Acute Respiratory Syndrome Corona Virus (SARS-CoV)^[2-4], and Middle East respiratory syndrome corona virus (MERS-CoV)^[5,6] produced more than 10 000 cases, with mortality rates of about 10% for SARS-CoV and about 37% for MERS-CoV^[7,8].

A novel SARS-CoV2 virus appeared since December 2019 and triggering the Corona virus disease (2019-nCoV or COVID-19)^[9]. The new studies reported similarities in clinical features of COVID-19 and previous corona virus infections (SARS-CoV and MERS-CoV infections)^[9-11], most patients presented with, dry cough, fever, dyspnea, and bilateral ground-glass opacities on chest CT scans. However, signs and symptoms of upper respiratory tract such as sneezing, rhinorrhea, or sore throat were recorded in few patients with COVID-19^[10]. Usually the symptoms begin as mild, with only fever, cough, and occasional dyspnea. The severe symptoms such shortness of breath, and Acute Respiratory Distress Syndrome (ARDS), may occur 5-8 days into COVID-19 illness in a minority of patients^[11-13], indicating that the target cells of SARA-COV2 are located in the lower respiratory tract^[10]. Furthermore, COVID-19 patients rarely developed gastrointestinal symptoms (eg, diarrhoea), whereas about 20–25% of patients infected with SARS-

CoV or MERS-CoV developed diarrhea^[14].

Severity and mortality rate of COVID-19

The COVID-19 is an acute disease that is resolved but might lead to death, with a fatality rate of 2%. Death occur in severe disease due to advanced respiratory failure and enormous alveolar injury^[10,15]. However, a study revealed that the mortality rate estimated by deaths number relative to confirmed infection cases number, which is not typical of the actual death rate, for example as of March 1, 2020, out of (79968) patients in China tested positive for corona virus disease (2873) of them had died, equivalent to a mortality rate of 3.6%, and out of 7169 outside of China had confirmed positive for corona virus disease (104) of them had died equivalent to a mortality rate of 1.5%^[16]. and thus the mortality rate should be the total number of patients infected at the same time as those who died which is difficult to estimate since many patients with mild disease or asymptomatic might not tested^[17]. As the incubation period for this virus supposed to be up to 14 days^[18], and recently the world health organization WHO notified that the time between onset of symptom and death extended from 2- 8 weeks^[19], so the mortality rate can be re-estimated by dividing the deaths number on a given day by the patients number with established COVID-19 infection 14 days before. On this basis, using WHO data on the cumulative deaths number to March 1, 2020, mortality rates would be 5.6% for China and 15.2% outside of China^[17]. But

the result of this study might underestimate the potential risk of COVID-19 in symptomatic patients which reflected by a recent time delay adjusted estimation which reported that the mortality rate of COVID-19 might be as high as 20% in Wuhan, the site of the outbreak^[20].

Table (1) revealed the mortality rate reported among several studies. A study conducted in Wuhan, China detected that in hospital the mortality rate for 191 patients included in the study with follow up until discharge (n=137) or death (n=54) were (28%) and was very high among 32 patients who needing the invasive mechanical ventilation, of whom (97%) were died^[21]. Another study also in Wuhan, China epicenter of the disease revealed a mortality rate of 62% among 52 total critically ill patients included in this study with COVID-19 and 81% among those requiring mechanical ventilation^[22]. The time between hospital admission and acute respiratory distress syndrome (ARDS) might be as short as 2 days^[10]. This study reported that by comparison with non-survivors, survivors were more expected to develop ARDS with frequency [81%] vs [45%] and were more likely to receive mechanical ventilation [94%] vs [35%]. The outcome were (81%) of 37 patients requiring mechanical ventilation had died by 28 days which higher than critically ill patients with severe acute respiratory syndrome (SARS) in Canada^[23], Singapore^[24], and Hong Kong cohort^[25], and also higher than critically ill patients with MERS infection in Saudi Arabia^[26].

Another recent study revealed that the mortality rate is high for 2019-nCoV,

because (15%) of 41 patients included in the cohort died^[10]. While other study on COVID-19 patients admitted to Wuhan Jinyintan Hospital, China found that out of 99 patients included in this study 57 (58%) were remained in hospital, 31(31%) were discharged, and 11(11%) were died^[27]. Also in China, a study on 138 patients with confirmed novel coronavirus (2019-nCoV)-infected pneumonia (NCIP) at Zhongnan Hospital of Wuhan University, China, found that 47 patients (34.1%) were discharged while 6 patients died (the overall mortality, 4.3%), and the remaining patients were still hospitalized^[11].

Interestingly, study on 1,099 patients with 2019-nCoV with acute respiratory disease from 552 hospitals in 31 provinces/province-level municipalities, 173 and 926 patients were categorized into sever and non-severe subgroups, respectively. This study found that the fatality rate was (1.4%)^[13]. Furthermore, in Italy a study revealed that the overall case fatality rate of patient with confirmed COVID- 19 was 7.2% (based on data up to March 17, 2020) which is higher than in China 2.3%. This study explained the differences of mortality rate by three main factors: fatality rate and population age, definition of COVID-19-related deaths, and testing strategies^[28].

There was a lack information about the prevalence of the disease among asymptomatic persons, so to evaluate the real prevalence of covid-19, the real number of infected cases showed be included. Therefore, the real mortality rate remains unknown.

Table (1): Mortality rate estimations among several studies

Study	No. of case included	Mortality rate	Country	Study design
Zhou <i>et al</i> ^[21]	191 patients	28%	China	Retrospective cohort study
Yang <i>et al</i> ^[22]	52 critically ill patients	62%	China	Single-centre, retrospective, observational study
Huang <i>et al</i> ^[10]	41 patients	15 %	China	-----
Chen <i>et al</i> ^[27]	99 patients	11 %	China	Retrospective, single-centre study
Wang <i>et al</i> ^[11]	138 patients	4.3%	China	Retrospective, single-center case series
Lescure <i>et al</i> ^[29]	5 patients	20%	France	Case series
Guan <i>et al</i> ^[13]	1099 patients	1.4%	China	Retrospective study

Factors associated with increase the severity of COVID- 19

Early identifications the risk factors for COVID-19 is necessary not only to recognize the defining epidemiological and clinical features with better accuracy, but also promoted suitable supportive care and facilitate the admission to the intensive care unit (ICU) if needed ^[30].

Age and gender

Previous studies had been reported older age as an important independent predictor of mortality in both SARS and MERS ^[31,32].

A study in Lancet, conducted on 191 patients with COVID-19 from Wuhan, China during the first outbreak month and follow them to recover (n=137) or death (n=54). The study found that the median age of the 191 patients was 56 years with age ranging from 18 years to 87 years, and most patients (62%) were male gender and (70%) of them were none survived so this study confirmed that increased age was associated with death in patients with COVID-19^[21].

Also, in Lancet, a study conducted in intensive care unit (ICU) of Wuhan, China on 52 critically ill patients. And follow up until recover (n= 20) or death (n=32). The mean age of study patients was 59.7 years

(SD 13.3), (52%) were elderly patients (>60 years) and (67%) patients were men. In this study the non-survivors were older than survivors “64.6 years [11.2%] vs 51.9 years [12.9%]” ^[22].

Recent study on 41 patients who admitted to designated hospital, Jin Yintan hospital (Wuhan, China). This study reported that (49%) patients with COVID-19 were aged 25–49 years, and (34%) patients were aged 50–64 years, no children or adolescents were infected and most of them were men ([73%] of 41 patients included in this study) ^[10]. Another study on 99 patients confirmed to had COVID-19 disease found that the age group were ranged from 21-82 years and higher percentage (30%) were patients between 50-59 years old and as with other studies most of them were men (68%) ^[27]. Also, a study on 138 patients with confirmed novel coronavirus (2019-nCoV)-infected pneumonia (NCIP) at Zhongnan Hospital of Wuhan University, China, found that the median age was 56 years (range 42-68 years) and (54.3%) were men. In this study by comparison with patients who did not needed ICU (n = 102), the patients that needed ICU care (n = 36) were older with statically being significant (median age, 66 years vs 51 years; $P < .001$) ^[11]. Another study at

Wuhan union hospital on 43 cases confirmed with covid-19 found that the median age was 62 years and nearly no differences on gender revealed as 22 patient were male and 21 patient were female^[30], this study also included result of the first 37 cases died of COVID-19 in Wuhan city and the 1019 survived patients with COVID-19 from six cities with a high prevalence of the disease. The study reported that the COVID-19 infected patients were elderly patients (median was 70 years) and 83.8% were aged ≥ 65 years when compared to those who survived (median 47 years and 13.2% ≥ 65 years) noting that none of the 37 deceased cases was pediatric patient. Also the study revealed that the proportions of male were 47.8% (Shenzhen city, n=278), 48.2% (Wenzhou city, n=199), 48.3% (Beijing city, n=174), 48.6% (Changsha city, n=140), 60.0% (Xinyang city, n=125) and 52.4% (Hefei city, n=103) respectively in these cities so the overall total will be 50% were men in survived cases. On the other hand of the 37 deceased patients, (70.3%) were men. So as conclusion to this study is while women and men had the same exposure rate, men were more susceptible to dying^[30]. A case series of the first COVID-19 cases in Europe. The study included 5 Chinese origin patients who travelled to France and admitted to two hospitals in France where diagnosed with COVID-19, three of them were men (aged 31 years, 48 years, and 80 years) and the others were two women (aged 30 years and 46 years). Only the 80-year-old patient was died on day 14 of illness while all other patients had fully recovered and discharged^[29].

On the other hand, a study on 140 patients diagnosed with COVID-19 that admitted to designated Hospital of Wuhan. The median age was 57 years, and the majorities (70%) were older than 50 years old. about 1:1 ratio of female (50.7%) male which might be different from other studies of men being the highest proportion^[33]. However, a study on 425 patients with confirmed

Novel Coronavirus-Infected Pneumonia (NCIP). The cases median age was 59 years, and 240 (56%) patients were male. The study found that the patients with earlier onset were slightly younger, and more likely to be male, and likely to reported exposure to the Huanan Seafood Wholesale Market^[34]. In Singapore a study among 36 patients with COVID-19, of the infected persons, 17 were established positive for SARS-CoV-2 in Singapore, with median of 40 years and age range from (36-51 years) and most of them were female gender 10(59%) and the rest were male 7(41%) and the nationality were Singaporean 13(76%), Chinese 3(18%), and Indonesian 1(6%) respectively^[35]. In China study on 1099 patients from 552 hospitals found that the median age was 47 years (range from 35-58 years), 0.9% were patients with age below 15 years and 41.9% were females. The age differed significantly between the two groups non- sever patients (n=926) group and sever patients (n=173) group with mean age 45 years (range 34-57 years) for non-severe patients and mean age were 52 years (range 40-65 years) for severe patients group ($P < 0.001$)^[13]. The sever ARDS is the primary pathophysiology of severe viral pneumonia, men and older age people (> 65 years) are more probable for ARDS than women or young age people^[36]. Therefore, it is rational that the death at 28 days that associated with SARS-CoV-2 pneumonia is comparable to death due to severe ARDS, nearly 50%^[37].

Generally, elderly people are more vulnerable to severe pattern of COVID-19 disease than people younger than 50 years; probably because of health issues and comorbidities in that population group^[33]. Male more than female affected by COVID-19, in studies that reported male predominance over female (Huang *et al* 73%, Chen *et al* 68%, Yang *et al* 67%) they found that (66%, 49%, 33% respectively) of patients reported exposure to this wet market which might be strongly

linked to the occupational risk factors for men in Huanan wet market in that studies [10,22,27], this can be confirmed by a study which reported 1:1 male to female ratio in which no case had an exposure history of Huanan wet market [33]. Most of these recent studies were lower than SARS–infected patients, which observed a female predominance (61%) [38]. On the other hand, lower infection rate was observed in children with milder symptoms [34].

Smoking history

Data have revealed that use of tobacco significantly increases the angiotensin converting enzyme expression, the binding receptor for corona virus [39], that could clarify the increased exposure to COVID-19 in smokers [40]. Additionally, cigarette smoking is the chief reason for chronic obstructive pulmonary disease (COPD), that has been detected as an independent risk factor in severe cases with COVID-19 [13].

Recent study found that (6%) of 191 total patients included in this study had current smoking, the patients in this study had divided into two groups non-survivor (n=54) and survivor (n=137) in which current smoking found in 5(9%) and 6(4%) respectively [21]. Another study found that (4%) of 52 patients included in this study were smokers and all of them were survived after following them until discharge [22].

Also, a study on 41 patients with COVID-19 found that (7%) of those patients reported to had current smoking of whom don't require intensive care unit (ICU) [10].

While another study found that only (6.4%) of 140 patients included in the study had a history of smoking, and (5%) of them were past smokers and (1.4%) were current smokers [33].

A study conducted on 1099 patients in China reported that out of 1085 patients that had recorded smoking history 85.4% never smokes, 1.9% had Ex- smoking history, and 12.6% were current smokers. Surprisingly, higher percentage of patients

in both group severe and non-severe group were never smoking (77.9% vs 86.9% respectively), but on the other hand the frequency is higher in severe group versus non-severe group in patients who are currently smoking (16.9% vs 11.8% respectively) [13]. However, according to these studies, the relatively small percentage of current smokers compared with the percentage of smokers (50.5%) in China are unlikely to be related with the incidence, severity, or mortality rate of COVID-19

History of co-morbidities

The poorer clinical results in patients with COVID-19 may related to the presence and number of co-morbidities [41]. Recent study found that co morbidities were present in nearly half of patients, with hypertension (30%) being the most common co-morbidity, followed by diabetes (19%) and coronary artery disease (8%) [21].

Another study found that (40%) patients who admitted to the hospital had chronic diseases, cerebrovascular diseases founded in (13.5%) of 52 total patients, all were died at 28 days. Followed by diabetes in 9 patients whom 2 (10%) had survived and 7 (22%) whom died at 28 days [22]. On the other hand, a study found that less than half (32%) had underlying diseases which including diabetes (20%), hypertension (15%), and cardiovascular disease (15%) [10]. Also study on 99 patients with COVID-19 disease admitted to Wuhan Jinyintan Hospital found that (51%) patients had chronic medical diseases, cardiovascular and cerebrovascular diseases was recorded with (40%), endocrine system disease in (13%), digestive system disease (11%), (1%) for each of respiratory tract disease, tumor, and nervous system disease [27]. Another study on 138 patients, reported that 46.4% had one or more concomitant medical problem mostly hypertension HT (31.2%), diabetes DM (10.1%), coronary artery disease CAD (14.5%), and malignancy (7.2%) were found to be the most common

coexisting diseases, interestingly when compared patients who did not obtain intensive care unit (ICU) ($n = 102$), the patients that needed ICU care ($n = 36$) and were more probable to have underlying co-morbidities, including HT (58.3% vs 21.6%, DM (22.2% vs 5.9%), CAD (25.0% vs 10.8%), and cerebrovascular disease (16.7% vs 1.0%)^[11]. A study on 43 patients reported that 37.2% of patients had at least one underlying condition with HT being the highest (47%) one followed by DM (21%), and the rest will be had chronic lung diseases and cardiovascular diseases)^[30].

The same study compared the result obtained from the Chinese Public Health Science Data Center, the data includes the first 37 cases died of COVID-19 in Wuhan city in addition to 1019 survived patients with COVID-19 from six cities with a high prevalence of the disease this study found that of these patients, 64.9% had at least one previous condition (i.e., cardiovascular disease, DM, HT, or COPD)^[30]. Another study also reported high prevalence of co-morbidities among covid-19 patients as out of 140 patients included in the study, (64.3%) patients had at least one previous co-morbidity, especially HT (30%) and DM (12.1%). only (1.4%) COPD patients were identified^[33]. Another study found that of the totally 36 infected patients, 17 patients were positive for COVID-19 in Singapore 3(18%) were found to had medical illness [Allergic rhinitis (AR) ($n=1$), HT($n=1$), and cervical spondylosis ($n=1$), while the rest 14(82%) had no history of medical illness^[35]. Guan *et al* found 25.2% of 1099 patients included in the study had at least one previous disease which was significantly more prevalence in severe cases ($n=173$) than mild cases ($n=926$) with frequency of (38.2% vs. 22.5%, $P<0.001$)^[13].

However, HT, DM and cardiovascular diseases were the most common underlying diseases, can be related to the general prevalence of HT and DM in

China which was 23.2% and 10.9% respectively^[42,43].

Pre- existing liver diseases

Chronic liver disease is one of major disease that burden globally and affects about 300 million people in China^[44]. Previously liver damage has been detected in up to 60% of SARS –patients^[45], and has also been detected in MERS-CoV – patients^[46]. Several studies showed the severity of COVID- 19 in patients with pre- existing liver diseases^[13,44,47]. A study on 1099 patients with laboratory established cases of COVID-19 in China noted that hepatitis B found in (2.1%) of COVID- 19 infected patients and it more predominant in non-severe cases ($n= 926$) than severe cases ($n=173$) (2.4% vs 0.6%)^[13]. While the other study, only 1(2.0%) patient out of 41 patients with COVID-19 was suffered pre-existing chronic liver disease. Patients with severe disease ($n =13$) who require care in the ICU had elevated frequency of abnormal liver function. Increase in aspartate transaminase level was founded in 8 (62%) of 13 cases in the ICU compared with 7(25%) of 25 cases who did not needed the ICU^[10]. The study included 99 patients with COVID-19, (43.0%) patients were with pre-existing liver disease. Only one patient suffered severe liver damage^[27]. While other study founded that out of 62 patients with COVID-19 (11%) of them were patients with pre-existing chronic liver disease and (16.1%) patients suffered abnormal liver function^[12].

Another recent study reported that only (8.6%) out of 81 patients confirmed with COVID-19 had pre- existing liver disease. In this study the cases who had a diagnosed with COVID-19 in the subclinical phase had low abnormalities of aspartate transaminase level compared with cases diagnosed after symptoms onset^[47]. The patient($n=52$) in another study had no history of previous liver disease but this study founded (29%) patients with abnormal liver function and no difference

between non-survivors (28%) and survivors (30%) for the incidences of abnormal liver function ^[22]. Another study reported that from 56 patients with COVID-19, (3.6%) were suffered previous liver disease and 1(28.6%) exposed to abnormal liver function. Data from this study found that liver damage is more predominant in severe COVID-19 cases than in mild cases and one patient with liver injury was not survived ^[44]. The direct SARS-COV2 infection of liver cells might be the cause of liver damage but could related to other reasons such as systemic inflammation and drug toxicity ^[44].

However, further studies should concentrate on the reasons of liver damage in COVID-19 patients and the effect of liver co- morbidities on results of COVID-19.

Pre- existing cancer

Generally, infection can affect the patients with cancer more than healthy individuals due to decreased their immunity that caused by malignant status and anticancer therapies ^[41]. Patients with cancer might be more prone to COVID-19 due to their immunocompromised status ^[44]. In a nationwide analysis study from 575 hospitals in 31 provincial regions in China, 18(1%) patients had cancer history from 1590 COVID19- patients. This study not only concluded that cancer patients were at a higher risk of COVID-19 but also, they were having higher risk of severe events and poorer outcomes than cancer-free patients ^[48].

Study in China founded that from 1099 patients, 10 (0.9) patients had cancer history, 7 (0.8) were non sever cases, while 3 (1.7) were sever cases ^[13].

The study on first cases of COVID-19 in France included five cases, one case was male (80 years) had thyroid cancer history and was the only patient that not survived ^[29]. Other studies reported high risk for COVID-19 in patients with cancer history without bad outcomes ^[10,21]. Also, a study

founded that from 41 patients with COVID-19, 1 (2%) patient with cancer history and this patient dose not required ICU care ^[10]. The retrospective cohort study *in* Wuhan, China reported that out of 191 patients with COVID -19, 2(1%) had previous cancer history and these 2 patients were among 137 survivor patients ^[21]. The major problem for cancer patients is inability to get the necessary medical facilities. Also, patients with cancer require appropriate identification and management of critical cases ^[49].

The authors of some these studies indicate that patients with cancer might get worse outcomes from COVID-19. However, study on 138 patients with COVID-19, 10 (7.2) had cancer history, 4 (11.1) need ICU care. This study founded that the median age of cancer patients was significantly higher than those without cancer (63.1 years vs 48.7 years; respectively) suggesting that older age is correlated with worse outcomes with COVID-19^[11]. The prevalence of COVID-19 in cancer patients would be more explanatory in evaluating whether or not the cancer patients have an elevated risk of COVID-19.

Overall, this observation remains insufficient to conclude that cancer patients with COVID-19 had a worse outcome and to clarify a conclusive link between COVID-19 and cancer. according to early mild demonstration of COVID-19, it may be difficult to recognize which patients will be more susceptible to experience severe illness and will be more likely to experience ARDS and which patients will face the death by only using the presented risk factors such as age, gender smoking history, and co-morbidities.

Limitation of the study

Not all studies regarding COVID-19 were included in this study, as there are for sure many other studies which might give another insight to the result highlighted in this study. The second limitation is that

lack of studies among several other countries that found to have higher prevalence of the disease and higher mortality rate. Third, Lack of studies that include mortality rate since it only founded in studies that do follow up to their patients or in a study which is retrospective in nature.

Conclusion

In conclusion, older age is a predominant risk factor for COVID- 19 severity and morbidity, and is more likely to infect older men with comorbidities which might leads to complicated and even fatal respiratory tract diseases such as ARDS. In many studies, hypertension, diabetes and cardiovascular diseases being the main chronic disease presented in many patients that infected with COVID-19, while the low prevalence smokers indicating that smoking history may not be the risk factor for COVID-19. Data suggested that liver damage is more predominant in severe cases of COVID-19 than in mild cases especially with pre-existing liver disease. However, patients with cancer were at a higher risk of COVID 19 but whether or not they have high risk of poor prognoses and sever event not fully established.

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