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The Correlation between Age and Coronavirus Infections

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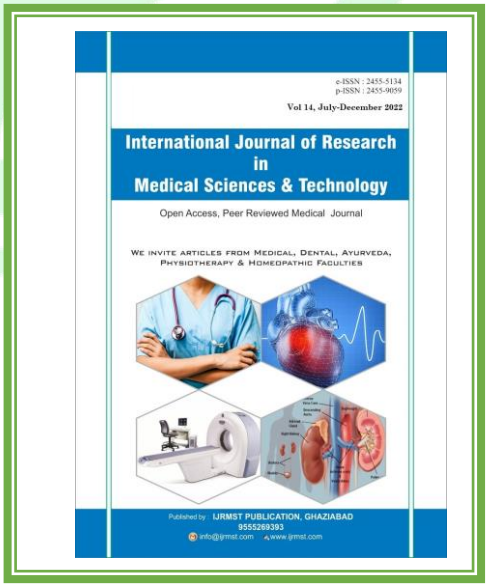

ABSTRACT

The global outbreak of coronavirus (COVID-19) in 2019 has attracted worldwide attention and increased concerns due to the rapid spread and progression of the disease. Despite the higher risk of death which is linked with COVID-19 in elderly patients, few studies have focused on how the clinical features and prognosis of COVID-19 patients differ between different age groups including 50 years, 50 to 60 years, and people aged above 60. A thorough assessment of age allows physicians to risk-stratify all COVID-19 patients regardless of where they are, as studies have shown that the clinical presentation and prognosis of the disease differ between age groups. Patients over 60 years of age have worse disease severity, more severe clinical symptoms and longer disease duration compared to those under 60 years of age. One of the major challenges facing public health and clinical experts during a pandemic is the diversity of disease severity. Understanding morbidity and mortality by age associated with COVID-19 is critical, as it affects treatment choices, prognostic expectations, and triage. This analysis concluded that patient clinical characteristics and disease prognosis change with age and that careful age assessment can help clinicians worldwide to risk-stratify all COVID-19 patients. In the present review, we do focus on the relationship between ageing and diseases profile or associated morbidities.

Keywords: *Covid-19, Risk Factor, Age, Elderly Covid-19, Chronological ageing, COVID-19.*

INTRODUCTION

Despite the large number of studies on COVID-19, there is a lack of information on the epidemiological characteristics and clinical features of patients of different ages and genders [1]. Many studies have focused on the elderly and pediatric populations [2,3,4]. Laboratory findings and radiomics of patients have rarely been included in these studies. Researchers often study the relationship between COVID-19 and demographic variables for underlying disease and hospitalization [5,6].

Understanding non-minor risk factors are important for risk classification and effective treatment. To do this, physicians must understand how well demographic factors such as age, sex, race, and nationality-predict severity and outcomes for COVID-19. Conducting research on this topic is difficult because it requires observational studies that cover the full range of disease severity. Because non-serious patients are usually not

hospitalized, cases without symptoms or with only mild symptoms are often not studied [7]. A study cohort is not representative of the age of the entire population, which has implications for risk assessment. Variation in age-specific COVID-19 mortality rates recorded between sites can be attributed to the same problem. Diagnosis at the time of hospitalization and treatment in an inpatient unit at the start of the outbreak for all patients with COVID-19 was confirmed by reverse transcription polymerase chain reaction (PCR) [8].

Through analysis of numerous studies, it has been determined that the high incidence of COVID-19 is age-related. Diseases and conditions associated with the following facts tend to worsen with age, ultimately increasing the risk of morbidity and mortality associated with COVID-19 Diseases such as diabetes, cardiovascular disease, other disorders and hypertension are among them [9].

The chance of developing hypertension increased with age, rising from 16% in patients younger than 50 years to 27% in patients aged 50 to 60 years and finally to 47% in patients older than 60 years. Across all age groups, coupled hypertension is associated with fatal rates, and COVID-19 is associated with a high risk of fatal and adverse outcomes as well as severe clinical symptoms [10]. Conversely, according to some studies, patients around 50 years of age are at greater risk of death and higher mortality than those over 60 years of age [11].

Overall, 15% of people over the age of 40 have diabetes, and the prevalence of the disease appears to increase with age: 10% for those under 50, 15% for those between 50 and 60, and 24% for those over 60 [12]. A meta-analysis showed that people with diabetes, especially those with a long history of diabetes, had severe COVID-19, COVID-related deaths, and an increased risk of fatal outcomes. On the other hand, patients older than 60 years were less likely to die than patients younger than 50 years [13].

According to another study, COVID-19 patients older than 60 years have a higher risk of respiratory failure and require longer care than patients younger than 60 years. This finding raises the possibility that older COVID-19 patients are significantly sicker and less responsive to treatment than younger patients [14]. patients older than 60 years have a higher cure rate than men or patients with respiratory failure [15]. According to previous studies, men may be more susceptible to COVID-19, although there

was no association between patient gender and disease severity. To improve their prognosis, these older adults with respiratory insufficiency need more care and improved early intervention [16]. The age-related findings may be accepted by physicians worldwide if huge research with a multicenter study is conducted and more cases from other ethnic and genetic backgrounds are evaluated [17].

Since the percentage of immuno-incompetent individuals in a group correlates with the age structure of that group, age appears to be an important risk factor for the severity and consequences of COVID-19 [18]. The following is a review of studies on the age-related features of COVID-19. Children are less likely than adults to have a serious infection with COVID-19. This information comes from a study on the viral load of SARS-CoV-2 by patient age [19]. They were underrepresented in the study cohort, giving the impression that they were more resistant to the disease. There are some controversial findings regarding the category of young adults. The authors speculate that the reduced attachment to social distancing in young adults may have an impact on the prevalence and mortality rates specific to their age group [20].

Older patients with COVID-19 are at higher risk of developing serious diseases. Logically, comorbidities due to ageing are the main reason for the increased mortality observed in this age group. However, physicians should not generalize the ageing pattern of the population to the individual level [21]. Otherwise, a patient may be classified as high or low risk based on his age rather than his actual health status, which may lead to inaccurate risk assessment, inefficient use of resources, and poor patient care.

As could be predicted, older adults and women have smaller lung volumes. It is difficult to interpret age-specific changes in some of the radiomic data because the clinical value of the data is unclear. There is a significant gender difference in the position of the centre of gravity along the axis in young and middle-aged adults [22]. This may be a result of men having more severe lung involvement and lung lesions being distributed in an up-and-down gradient in COVID-19-associated pneumonia.

The percentage of moderate instances decreased significantly with increasing age. The percentage of lung involvement used to determine the severity of COVID-19 did not differ between men and women [23]. For different age groups and genders, lung

lesions tended to be distributed over specific lobes of the lung. There were no significant gender differences in the elderly [23]. This difference was also non-significant in middle-aged adults, except for a significantly larger centre of gravity along the axial axis in men. These findings imply that the sex differences in COVID-19 may be due to changes in hormonal status. Age-related decreases in hormonal activity also contribute to the decreased sex differences in the disease [24,25].

IMMUNE DISEASES CONTRIBUTE TO COVID-19: ROLE OF AGEING

Immune senescence is often used in immunopathology to explain why older adults are more susceptible to infections. The process of immune senescence is intricate and complex. In summary, innate immune cells are not properly stimulated during infection and the transition to an adaptive immune response is uncoordinated with age, as the development of newborn T and B cells declines, and the activity of innate immune cells is disrupted [26]. These alterations reduce the effectiveness of viral clearance and increase the likelihood of triggering an immune response that is dysregulated and leads to a cytokine storm due to the high production of cytokines by highly active immune cells [27]. A well-known component of immunological ageing is chronic subclinical systemic inflammation, often referred to as inflammatory ageing. Since inflammation is a major pathogenic mechanism of COVID-19, the inflammatory response is believed to contribute to the worse prognosis of older COVID-19 patients [28]. The higher mortality and morbidity in older adults may be due to other age-related factors such as ageing immunity or ADE. A study found that older adults with COVID-19 fared significantly better than younger and middle-aged patients [29]. The mean number of co-morbidities increased with age [30]. In addition, older adults who lived in long-term care facilities were most at risk due to their chronic diseases and the impact of public housing.

As an important indicator of disease severity, the CRP count showed an age-related relationship with imaging indicators of lung involvement [31]. Most substrates showed higher counts in men than in women, while only a few laboratory data showed significant differences. This suggests that men may have more severe diseases and die more frequently from the disease in general [32]. Because older adults have higher levels of APTT, D-dimer, and fibrinogen than younger age groups, they are more likely to have a

hypercoagulable state and clot formation [33]. In addition, only the elderly have D-dimer levels that deviate from clinical reference values.

RENAL DISEASES CONTRIBUTE TO COVID-19: ROLE OF AGEING

Increased creatine kinase (CK) and lactate dehydrogenase (LDH) activities may indicate energy deficiency caused by hypoxia. Levels of these enzymes were found to be lower in younger people as compared to the people in middle-aged or older patients [34]. Levels of alanine aminotransferase (ALT) and aspartate aminotransferase (AST) which are liver enzymes, differed significantly between the three age groups, but a direct relationship between increased levels of these enzymes and age could not be confirmed because middle-aged individuals had the highest levels of enzyme activity [34]. The Dubai cohort showed significant differences in enzyme levels between men and women and between middle-aged and young adults. No clinically significant differences in platelet, white blood cell and red blood cell counts were found between individuals of different ages [35,36].

The key clinical indices and laboratory results examined in both clinics were correlated with age, gender, and the aforementioned factors. The course of the disease gets worse with age, according to disease progression markers. Both the significance of laboratory findings and the occurrence of clinical symptoms support this [37, 38]. Age and clinical severity had a moderately high positive connection, according to the studies.

CARDIOVASCULAR DISEASES CONTRIBUTE TO COVID-19: ROLE OF AGEING

Hypertension was the most common comorbidity found with COVID-19. The frequency of people with diabetes and high blood pressure did not differ significantly by gender. More midlife respondents were identified as having a serious or critical condition when compared to older people [39]. Diabetes mellitus, hypertension, chronic renal disease, and cardiac disease were all background disorders that were strongly correlated with disease severity [40]. Smoking prevalence had an adverse relationship with COVID-19 severity. This could account for the fact that young adults are twice as likely to smoke as middle-aged adults are, as well as the lack of a significant association between COVID-19 severity and current smoking across age groups [41].

None of the study cohorts had significantly different numbers of

comorbidities, but some comorbidities were more common in specific age groups. In addition, we examined data on smoking, which is associated with background conditions (e.g., cardiovascular injuries) that affect COVID-19 outcomes [42]. Consequently, a higher percentage of male patients in the 18-39 age group were current smokers. The 40-64 age group did not exhibit this trend and showed no significant differences; nevertheless, older female subjects had a higher frequency of asthma than older male subjects [43]. Significant gender differences existed with respect to chronic heart disease. Male patients were more common than females.

RESPIRATORY DISEASES CONTRIBUTE TO COVID-19: ROLE OF AGEING

A number of studies have studied lung involvement in different age groups of COVID-19. According to earlier studies, the percentage of involved lungs was 36.4% in the younger group and 67.9% in the group older than 60 years [44]. These data are consistent with opinions which do suggest that lung disease in younger people is about twice as large as in middle-aged people and three times smaller than in older people. The clear correlation between age and a measure called the "combined lung severity score" was evident in both sexes. In particular, men between the ages of 50 and 79 had higher score values. However, scores were even higher in women aged 80 and older [45].

Researchers have also found a strong association between chest radiology scores and disease progression in MERS patients with another form of coronavirus pneumonia. A recent study also found evidence of significant age differences in both symptomatic and asymptomatic patients with COVID-19. Total lung scores in symptomatic patients were greater in older than younger adults. In contrast, there were no significant differences in scores in the asymptomatic group [46]. The significance of the above studies is limited because almost all of them did not take into account background conditions that might bias the results.

Notably, men are more likely to be in a critical or severe state than women. A previous report on the chest evaluation of patients with COVID-19-associated pneumonia found that the mean lung density was higher in critical cases than in typical cases, which was almost certainly due to interstitial changes [47]. Many studies have been conducted to determine what causes higher mortality and more complications in the elderly. Some have

been able to link ageing to alterations in the blood coagulation system with procoagulants. For example, according to some studies, abnormal blood clotting may be associated with getting older. These coagulation abnormalities may lead to blood clotting problems and put infected individuals at greater risk. Studies of two age groups [under 60 and over 60] showed significantly higher APTT levels in the older group. fibrinogen levels were higher in patients over 60 years of age than in those under 60 [49].

HYPERCOAGULABILITY DISEASES CONTRIBUTE TO COVID-19: ROLE OF AGEING

In a Chinese study, there were no significant differences in absolute platelet counts between patients of different ages. Critically ill patients in both age groups with a cut-off of 60 years showed the same pattern. A research group from Iran revealed the same findings. In a study with patients in three age groups [60, 60-74 and 75 years], middle-aged patients had significantly higher platelet counts than younger patients, but the oldest patients showed the lowest platelet counts [50].

POLYPHARMACY AND LIFESTYLE: ROLE OF AGEING

The lifestyle of patients, such as obesity, smoking, alcohol drinking, and beverage consumption could affect the disease profile and pathogenicity[51-54]. Types of drugs used for the treatment of COVID-19 or patients' history of previous medications should be considered from the point of view of polypharmacy and its impact on geriatric patients[55-58], moreover, some drugs are tonic multivitamins [59-61]or zinc [62-64]which cud be used as add-on therapy for patients with other diseases and greatly impact the disease outcome or pathogenicity.

CONCLUSION

Age and the need for 02-year supplementation were strongly correlated. Men of all ages required intensive care more frequently than women. These facts support the biochemical finding that older age and males are directly associated with the process of disease progression. Older and middle-aged people were more likely to have non-mild COVID-19 than younger people. The age difference is even more pronounced when clinical markers rather

than radiological markers are used to assess the severity of the disease.

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