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Review Article

Effects of Vitamin D and Zinc Supplementation in Prevention and Treatment of COVID-19 among Older Adults: A Rapid Review

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Background. COVID-19 has robustly been associated with an elevated likelihood of severe disease progression and mortality among older adults. Although supplementation has the potential to serve as adjunctive therapy for COVID-19 prevention and treatment, the existing evidence in this regard remains limited. This review aims to search the evidence of vitamin D and zinc supplementation use in older adults to treat and prevent COVID-19 infection and its impact on health outcomes. *Method*. Articles focused on vitamin D or zinc supplementation doses or serum levels were identified from five primary databases, Ovid MEDLINE, Embase, CINAHL, CENTRAL, and Scopus, from January 2019 to March 2022. Data were extracted and summarised. Risk of bias was conducted for both randomised and nonrandomised studies. *Results*. After screening 977 articles initially, only five articles were obtained, consisting of one randomised controlled trial study, two quasi-experimental studies, and two cohort studies. The included studies had a total of 606 older adults. The current review highlighted the outcomes of vitamin D and zinc minerals among older adults during COVID-19. The quality of included studies was one with some concern, two with moderate risk of bias, and another two with a serious risk of bias. Two studies found higher vitamin D intake lowered mortality rates, one study showed improvement in COVID-19 severity, and another study linked lower serum zinc levels to higher mortality rates and disease severity, while one study found no association. *Conclusion*. The present review has shown the supplemental use of vitamin D and zinc as an adjunctive intervention among older adults, with a heterogeneous assessment of COVID-19-related mortality and disease severity outcomes. Vitamin D and zinc supplementation may exert a protective effect on COVID-19 outcomes. Consequently, there is a pressing need for more comprehensive and rigorous trials to confirm these findings.

1. Introduction

Since the emergence of coronavirus disease (COVID-19) caused by the SARS-CoV-2 virus in December 2019, it has infected millions of people and triggered thousands of deaths worldwide [1, 2]. The most common side effects of the viral infection were mild to severe respiratory ailments, commonly resulting in rapid recovery without an additional therapy. On the other hand, some will get very sick and need medical attention. Geriatrics or people with underlying medical conditions such as cardiovascular disease, human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV and AIDS), hepatitis, diabetes, kidney disease, chronic respiratory disease, or cancer are at greater risk of developing severe illness than those not infected [3–7]. COVID-19 can affect everyone, irrespective of age, and these people can become seriously ill or die [8]. Compared to younger adults, older patients have shown an

increased need for intensive care unit (ICU) admission and mechanical ventilation, and the mortality rate is also high [9, 10].

The national medicines regulatory authorities enforced the approval of several vaccines and antivirals for COVID-19 prevention and treatment [11]. However, many prescribers and health regulatory agencies still recommend using herbal and alternative medicines as adjuvants for COVID-19 [12–15]. Recent literature reviews have highlighted the positive outcomes of complementary and alternative medicines (CAMs) in managing and alleviating the symptoms of COVID-19 infection [16, 17]. CAMs are healthcare approaches constructed out of modern and western treatment and medication strategies [18]. Micronutrient supplements, traditional Chinese medicine, herbal medicine, and ayurveda have been utilised extensively in treating COVID-19 patients in China, Pakistan, and India during the outbreak [19]. WHO also acknowledges that 80% of the African population relies on CAMs for their healthcare needs [20]. Traditional medicine is growing in popularity in Asia and Africa due to the ease of access, low cost, and perceived low toxicity of this type of medicine [21]. In the United States, there were reported higher rates of supplements among older adults that focus on glucosamine, chondroitin, and omega-3 fish oils [22]. Supplements include a variety of vitamins and minerals as well as herbal nonvitamin products [23]. Recently, vitamin D and zinc supplements were argued as to whether if they have any benefits in the outcomes of COVID-19 among older adults. Vitamin D provides an adaptive and innate immune system by decreasing the expression of proinflammatory cytokines and increasing the expression of anti-inflammatory cytokines [24, 25]. Zinc has regulatory effects on the growth and activity of immune cells and the cytokine storm, which has proven to be a potent agent to destroy viruses, bacteria, and tumor cells [26, 27].

During the initial stage of the pandemic, non-pharmacological interventions such as maintaining good hygiene and avoiding close contact were implemented to combat the spread of COVID-19 [28, 29]. During COVID-19, people's physical and mental health suffered because of prolonged home confinement and social isolation, as evidenced by the prevalence of mental health disorders and increased frequency of harmful lifestyle modifications [30]. Supplementation can enable self-care and health promotion which might help restore a person's quality of life [31]. Furthermore, evidence showed that supplementation, such as zinc and vitamin D, could shorten the duration of COVID-19 symptoms [32]. In addition, several other approaches, such as herbs and vitamins, have been shown to reduce stress and anxiety while boosting immunity [14, 33–35]. There is interest among older adults in whether these micronutrient supplements have a role in preventing and treating COVID-19.

This review focuses on the analysis of vitamin D and zinc in older adults due to their potential anti-inflammatory and immunomodulatory properties. Previous research has found low serum levels of micronutrients such as vitamin D and zinc in critically ill COVID-19 patients [36, 37]. However, limited studies have found that low serum levels of vitamin D and zinc are associated with poor outcomes in COVID-19 patients [37, 38]. Thus, existing studies on these micronutrients remain unclear and conflicting. Therefore, this study aims to search the evidence of vitamin D and zinc supplement use in older adults to treat and prevent COVID-19 infection. Specifically, this study aims to evaluate the impact of such supplementation on health outcomes, including hospitalisation rates, need for mechanical ventilation, admission to intensive care units, and mortality.

2. Methodology

The study protocol has been registered at PROSPERO CRD42021278308. The review was performed based on the guidelines reported by the Cochrane Rapid Review Methods Group [39]. Healthcare professionals, i.e., doctors from hospitals, were consulted to ensure that the research questions were appropriate to the outcome of interest.

2.1. Search Strategy. Two reviewers searched for the following five databases: MEDLINE (Ovid), CINAHL, Embase, Cochrane Central Register of Controlled Trials (CENTRAL), and Scopus from January 2019 to March 2022. Additional resources were searched under the hand-searching references list. The search was conducted in the English language only (see Supplementary Material 1 for a complete search strategy).

2.2. Study Selection. The team conducted a pilot exercise on 50 abstracts before the screening process to calibrate and test the review form. An information specialist was involved in the database search. During the screening, two reviewers, CM and AA (a), screened and reviewed the titles and abstracts of the identified studies using the search strategy and those from additional sources based on the eligibility criteria (Table 1). Another reviewer, SS, screened all the excluded abstracts while the reviewer, BKC, resolved any conflicts or disagreements. Following that, the reviewer, CM, performed the full-text screening, and another reviewer, AA (a), screened all the excluded full-text articles.

2.3. Data Extraction and Appraisal. Data were extracted using a standardised form and confirmed for adequacy. CM extracted, and SS checked for the correctness and completeness of the extracted data. Data extracted included publication details (author and year of publication), study design characteristics (study design, sample size, and country), study characteristics (type of intervention and follow-up duration), and main results of the study. Due to time constraints, one reviewer, CM, independently assessed the risk of bias in the included studies, and AA (a) checked for judgment verification. The Cochrane Risk of Bias (ROB 2.0), a revised Cochrane tool, was used for randomised controlled trials [40]. We used the Robins 1 tool for non-randomised and cohort studies [41].

2.4. Analysis. The included studies were subjected to a narrative synthesis. Each study was analysed and structured around the population characteristics, the type of intervention, and the outcome in preventing and treating COVID-19

Table 1: Eligibility criteria.

Population	Older population above 60 years old who takes vitamin D and zinc supplements with no COVID-19 infection or older population above 60 years old with COVID-19 infection who takes vitamin D and zinc supplements
Interventions	Vitamin D and zinc supplements
Comparator	Older population with or without COVID-19 infection who does not take vitamin D and zinc supplements
Outcomes	(i) Severity of COVID-19 infection, i.e., hospitalisation, mechanical ventilation, admission to ICU, and death (ii) Reduced risk of COVID-19 infection in those taking vitamin D and zinc supplements
Timing	2019–up to now
Settings	Any settings
Study design	Randomised control trials, nonrandomised control trials, and observational studies documenting vitamin D and zinc supplementation among older adults

among older adults. Meta-analysis was not conducted due to heterogeneity in methods and study designs.

3. Results

We obtained 977 articles through our search. After screening their titles and abstracts, we excluded 254 duplicates and 601 articles. Out of the remaining 122 articles, we excluded 117; and the final number of included articles was five (see Figure 1).

3.1. Study Characteristics. In the current review, five articles (one randomised controlled trial (RCT) study, two Quasi-experimental studies, and two cohort studies) were evaluated with 606 older adult patients [42–46]. Among them, two studies were conducted in France [42, 43], one study in Egypt [45], one study in Spain [44], and another in Italy [46]. The mean age of the participants was between 65 and 88 years. Two studies were based on the supplementation levels in serums [44, 46], and three other studies were analysed according to the dose of supplements given [42, 43, 45]. The finalised studies evaluated the impact of supplementation on COVID-19-infected older adults. Most of the studies assessed the effect of vitamin D except one study by Vogel–Gonzalez et al. [46], which analysed the zinc serum level outcomes. The length of follow-up ranged from two to twelve weeks. Three studies were conducted in hospitals [44–46], and two were in acute geriatric settings [42, 43].

Table 2 shows the characteristics of the included studies conducted according to the supplementation in serum levels, and Table 3 shows the included studies conducted based on the supplementation doses. Detailed intervention procedures are shown in Table 4.

3.2. Risk of Bias. As for the randomised controlled trial by Soliman et al. [45], the overall risk of bias is some concern bias arising in the randomisation and the selection on reporting the outcome. For the remaining studies, two studies developed a moderate risk of bias [42, 43], and two had a serious risk of bias [44, 46]. As the studies were not randomised trials, the four studies did not report on randomisation and allocation of concealment and had the risk of confounding bias. In addition, the outcome assessment methods were not comparable across intervention groups in a study [46]. Intervention biases were dominant in two studies where the classification of intervention probably could have been affected by the knowledge of outcomes [44, 46]. The summaries of each of the domains of ROB 2.0 and Robins tool are shown in Supplementary Figures 1 and 2.

3.3. Supplement Types

3.3.1. Vitamin D. Annweiler et al. [43] conducted a study on older adults with COVID-19 and provided them with either a total oral bolus dose of 50,000 International units (IU) of vitamin D3 per month, or 80,000 IU or 100,000 IU of vitamin D3 every 2-3 months. The study had the following three intervention groups: (1) COVID-19 patients who had received oral boluses of vitamin D supplements before their diagnosis over the course of a year, (2) COVID-19 patients who did not receive vitamin D supplements before their diagnosis but were given an oral supplement of 80,000 IU of vitamin D3 a few hours after diagnosis, and (3) COVID-19 patients who did not receive any vitamin D supplements or additional supplements after diagnosis. . In another related study, Annweiler et al. [42] predicted the outcome based on the intervention group, which had an intake of oral vitamin D before COVID-19 diagnosis, and the control group, which did not have prior oral supplementation. Likewise, Soliman et al. [45] evaluated older male adults with type 2 diabetes, diagnosed with COVID-19 and had deficient serum vitamin D levels (less than 20 ng/mL). The dose administered was 200 units intramuscularly once as a single dose. Regarding the serum levels of supplementation, Cereda et al. [44] mentioned that vitamin D levels were assessed and compared with both the intervention groups using the standardised normal serum level (30 ng/mL).

3.3.2. Zinc Supplementation. According to Vogel–Gonzalez et al. [46], a hospital-based observational cohort study was conducted on older adults who tested positive for COVID-19, where serum zinc levels were compared between the

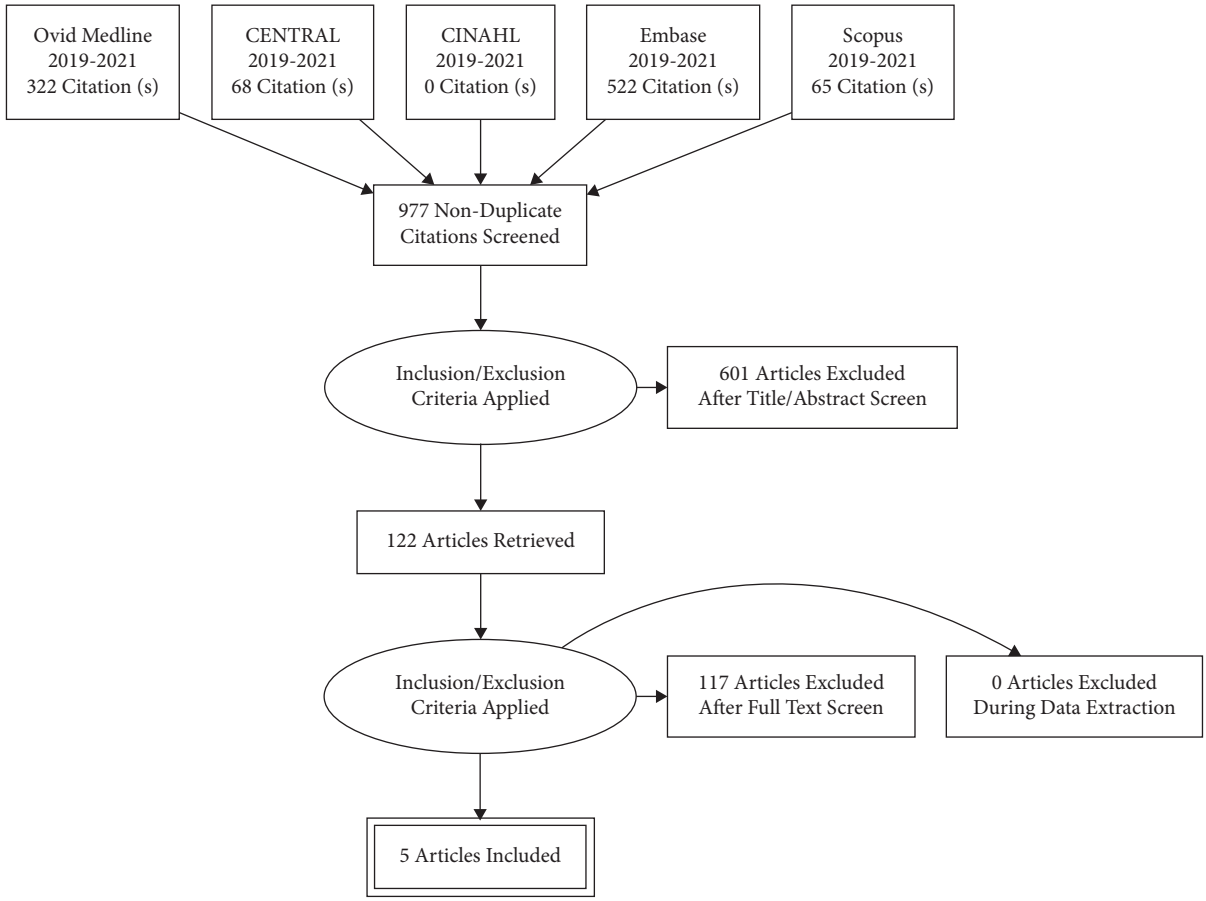

Figure 1: PRISMA flowchart.

intervention and control groups at initial diagnosis. Both groups were then monitored for four weeks. The study used a threshold of 50 μg/dL to indicate abnormally low zinc concentrations.

3.4. Outcomes

3.4.1. Mortality. Soliman et al. [45] and Cereda et al. [44] reported no association between supplementation and mortality rates. However, Annweiler et al. [42] proved that the outcome improved with 76.1% of COVID-19-positive older adults surviving at three months in the intervention group, compared to only 53.6% in the control group. In addition, Annweiler et al. [43] added that higher survival rates were achieved after supplementation; 93.1% of COVID-19 participants survived at day 14 (intervention group regularly supplemented with vitamin D over the preceding year), compared to 81.2% of survivors in group 2 (those supplemented with vitamin D after COVID-19 diagnosis) and 68.7% survivors in group 3 (control group). Conversely, Vogel–Gonzalez et al. [46] discovered that COVID-19 patients who survived had significantly higher zinc levels upon admission (62 μg/dL (52–72)) compared to those who died (49 μg/dL (42–53); $p < 0.001$). This suggests that patients with lower zinc levels are at a higher risk of mortality.

3.4.2. Severity of COVID-19 Disease. The Ordinal Scale for Clinical Improvement (OSCI) was utilised to differentiate various levels of COVID-19 clinical severity based on the required outcomes and treatments [47]. The score ranges from 0, indicating no clinical or virological indication of infection, to 8, indicating death. [47] Annweiler et al. [43] revealed that COVID-19 was high in the control group, and the intervention group (group 1: regularly supplemented with vitamin D over the preceding year and group 2: those supplemented with vitamin D after COVID-19 diagnosis) had the lowest score on COVID-19 severity. Furthermore, in their study, the intervention group two ($p = 0.40$) was associated with a lower risk of OSCI scores compared to the control group score which was ≥5. In addition, Vogel–Gonzalez et al. [46] concluded that lower serum zinc levels, which is lesser than 50 μg/dL at admission, correlated with worsening of COVID-19 clinical presentation. However, Cereda et al. [44] and Soliman et al. [45] reported no association between serum level of vitamin D and dose supplementation and the severity of COVID-19 infection.

4. Discussion

This rapid review assessed the efficacy of vitamin D and zinc supplements in preventing and treating COVID-19 in older adults. While consistent updates on the treatment procedures were globally shared to control the spread of the

Table 2: Characteristics of the included studies (serum levels of supplementation).

Author and year	Country	Study design and settings	Serum levels	Intervention sample size	Control sample size	Main outcome	Follow-up	Findings
Cereda et al. [44] 2021	Italy	Cohort study Hospital	Vitamin D3 Normal serum level (30 ng/mL),insufficiency (<3020 ng/mL), moderate deficiency (<20–10 ng/mL), and severe deficiency (<10 ng/mL)	30	99	(a) Mortality (b) Severity of COVID-19	4 weeks	No correlation was found between the absence of vitamin D supplementation and an increased mortality rate in patients with COVID-19
Vogel–Gonzalez et al. [46] 2021	Spain	Single-center cohort study Hospital	Zinc supplementation of 50 g/dL is a proper threshold of abnormally lower zinc concentration	58	191	(a) Mortality	4 weeks	At admission, lower serum zinc levels below 50 μg/dL were associated with a more severe clinical presentation, a longer time to reach stability, and a higher mortality rate

Table 3: Characteristics of the included studies (dose given).

Author and year	Country	Study design and settings	Supplements	Intervention sample size	Control sample size	Main outcome	Follow-up	Findings
Annweiler et al. [42] 2021	France	Quasi-experimental and acute geriatric care	Vitamin D3	67	28	Mortality	3 months	Out of the participants, 76.1% ($n = 51$) in the intervention group survived for three months, which was significantly higher compared to only 53.6% ($n = 15$) in the comparison group ($p = 0.03$)
Annweiler et al. [43] 2020	France	Quasi-experimental Acute geriatric care	Vitamin D3	Regular vitamin D supplementation: 29 (group 1) Vitamin D supplementation after COVID-19 diagnosis:16 (group 2)	32 (group 3)	(a) Mortality (b) Ordinal Scale for Clinical Improvement (OSCI) score for COVID-19 in acute phase	14 days	In group 1 ($n = 29$), 93.1% of COVID-19 participants survived at day 14, compared to 81.2% survivors in group 2 ($n = 16$) ($p = 0.33$) and 68.7% survivors in group 3 ($n = 32$) ($p = 0.02$).Group 1, but not group 2 ($p = 0.40$), was associated with a lower risk of OSCI score ≥5 compared to group 3. The severity of COVID-19 was high in the control group, and intervention group 1 had lowest score on COVID-19 severity
Soliman et al. [45] 2021	Egypt	RCT General hospital	Vitamin D3	40	16	(a) Mortality (b) Severity of COVID-19 (intubation)	6 weeks	No significant difference in mortality rate; control (17.5%) and intervention (18.8%), $p = 0.838$. Also, no significant severity was observed between these two groups; control (25%), intervention (35%), $p = 0.838$

Table 4: Detailed interventions of the included studies.

Author and year	Age (mean/median)	Inclusion criteria	Dose	Intervention procedure
Annweiler et al. [42] 2021	Mean age: 88.0 ± 5.5 years	COVID-19 patients	Bolus vitamin D3 (i.e., 50,000 IU per month, or 80,000 IU or 100,000 IU or 200,000 IU every 2-3 months), or daily supplementation with 800 IU	The intervention groups consisted of COVID-19 patients taking oral vitamin D supplements before their diagnosis and receiving bolus vitamin D3 treatment after being diagnosed with COVID-19. On the other hand, the comparator group did not have any prior oral vitamin D supplementation and was not administered bolus treatment
Annweiler et al. [43] 2020	Mean age: 88.0 ± 5.5 years	COVID-19 patients	Bolus included the doses of 50,000 IU vitamin D3 per month, or the doses of 80,000 IU or 100,000 IU vitamin D3 every 2–3 months	Group 1 consists of COVID-19 patients who had received oral boluses of vitamin D supplements before diagnosis over the year Group 1 did not receive additional supplements following diagnosis Group 2 is the group of COVID-19 patients not supplemented with vitamin D before diagnosis but who received an oral supplement of 80,000 IU vitamin D3 within a few hours of the diagnosis of COVID-19 Group 3 is the group of COVID-19 patients who received no vitamin D supplements and also no additional supplements following diagnosis
Soliman et al. [45] 2021	Mean age Intervention: 71.3 Control: 70.19	Older adults with type 2 diabetes and diagnosed with COVID-19 and aged more than 60 years males and having deficient serum vitamin D levels (less than 20 ng/mL)	200 units intramuscularly once as a single dose	Cholecalciferol and matched placebo (normal saline) were supplied in identical prefilled syringes
Cereda et al. [44] 2021	Mean age: 73.6 ± 13.9 years	COVID-19 patient	—	Serum 25(OH) vitamin D serum was assessed within 48 h since hospital admission
Vogel–Gonzalez et al. [46] 2021	Median age: 65 years	All patients admitted with COVID-19	—	Fasting blood samples were collected at 8 am from all participants. The cells were grown in multiwell 24 plates until they reached 80% confluence. For *in vivo* confocal imaging, cells grown on 22 mm coverslips were incubated with lysotracker, along with FluoZin-3AM or zinquin, in a solution containing 50 μM Zn^{2+} for 30 minutes. They were then washed twice with phosphate-buffered saline and placed in an isotonic solution for imaging with an SP8 Leica microscope (Wetzlar, Germany). The cells were exposed to various concentrations of Zn^{2+} and chloroquine for 48 hours, following which the supernatant was removed, and the cells were resuspended

disease, some countries could not afford targeted medication due to high infection rates, geographical issues, and economic status [47]. In such situations, complementary or alternative medicine was used alongside modern medicine to treat the population equally. The review showed mixed reviews on mortality and severity of COVID-19 outcomes using vitamin D and zinc supplementation among older adults during the pandemic.

Complementary medications, i.e., vitamin and mineral supplements, provide an alternative to modern medicines and are vital in improving the general well-being of an individual. According to several studies, proper vitamin C, D, and zinc intake shows promising results and a significant impact on the immune support [48, 49]. All three micronutrients demonstrate an essential role together; and it shows a harmonious relationship that boosts the functionality of the cells, thus making them less susceptible to pathogen entry. The current review mainly included vitamin D and zinc supplementation as a complementary medication consumed by older adults. A high dose of vitamin D did not substantially reduce the length of hospital stay or the mortality rate; however, vitamin D has shown a positive potential as an antithrombotic and an anti-inflammatory agent [48, 49]. As the disease reaches the two-year mark globally, there were significant findings on the effects of supplementation with vitamin D and zinc published in [50]. As the COVID-19 pandemic has continued to progress, the emergence of new strains of the virus, as well as the presence of comorbid conditions, age, and vaccination status, have all been factors that have impacted the survival rate of those infected with the virus. The severity of the disease, as well as the potential long-term effects, have also had a significant impact on the quality of life of individuals who have survived a COVID-19 infection. Despite efforts to control the spread of the virus through nonpharmacological interventions, such as social distancing and hygiene measures, the ongoing impact of the pandemic continues to be felt on a global scale.

Among older adults with a low level of vitamin D, it has been shown that the chances of being affected by COVID-19 are 4.6 times more than an individual with standard normal values [51]. According to Annweiler et al. [43], a study with three different groups of regimes was analysed. Consistent supplementation of vitamin D bolus is linked with a better survival rate in the geriatric population. The article could be a better example because participants were divided into three groups, one containing no intervention, the other two who were consistently on vitamin D supplementation, and another on supplement initiation after the COVID-19 infection. To arrive at a definitive conclusion, one can evaluate the effectiveness of interventions by comparing the intervention group with the control group in the population. In an article by Cereda et al. [44], the clinical outcomes exhibited an association with 25 (OH) vitamin D levels with a positive effect and in-house mortality in COVID-19-infected patients. An adjustment in major cofounders drove a definite promising conclusion. The study showed improved intensive care unit (ICU) admission rates among senior citizens [44].

A recent study published in Singapore by Soliman et al. [45], suggested that rapid bolus of vitamin D with six weeks follow-up for positive COVID-19 geriatric patients provided no significant outcome (recovery, intubation, or death). Patients were injected with a single large bolus of vitamin D rather than the daily low dose, thus targeting the rapid correction of vitamin D status in the older adult participants. However, the limitations on the number of participants in each group and the study duration (six weeks study) could lead to biases in the study, hence providing an inaccurate conclusion. Although the study recognises its limitations, utilising a more extensive and more diverse sample can lay the groundwork for exploring the potential association between vitamin D levels and clinical outcomes in older adults with COVID-19 infection [44, 45].

Zinc has been a crucial trace element in the development and growth of the human body, especially in maintaining immune function [52, 53]. Although zinc is available in approximately ten percent of the human proteome, it stimulates a range of signalling effects and, most prominently, the antiviral response [44]. Findings suggested that zinc has the potential as a micronutrient that acts as an anti-inflammatory mediator that could optimise the immune system function and decrease the risk of infection [54]. However, conflicting with this, in a published randomised control trial [55], the authors concluded that there were no significant differences between patients on vitamin C plus zinc or vitamin C or zinc individually. Participants who were not in any supplementation showed a drop in symptoms (50%) of fever, cough, tiredness, and shortness of breath, with a mean of 6.7 days. However, participants on the zinc supplementation reduced symptoms in 5.9 days [56]. The trace element therapeutic concentration roles were divided into two groups. One discussed the improvement of systemic immunity and antiviral response post supplementation of the zinc deficiency patient. The other discussed the capability of zinc to inhibit viral replication and impede infection-related symptoms specifically [44, 46]. Findings from this study suggested a relationship between serum zinc levels and COVID-19 outcomes [46]. The study presented with higher mortality and longer duration to achieve stability among patients identified with serum zinc lesser than 50 μg/dl at admission [46].

However, vitamin D and zinc supplementation showed promising results and effectiveness in the studied population. Our current review has constructed evidence on older adults consuming vitamin and mineral supplements as an adjunct therapy to maintain and improve their immunity. Therefore, healthcare professionals should help older adults by providing sufficient information about supplements, especially vitamin D and zinc supplementation, i.e., drug interactions, dose, possible interaction with the current disease, and making an informed decision regarding the responsible and evidence-based use of complementary and alternative medications.

4.1. Strengths and Limitations. The current review mainly focused on the older adult population, effectively reviewing the utilisation of vitamin D and zinc supplements. Second, the

study looked into the prevention and treatment of COVID-19, which could show the benefits of the included supplementation for the older adult population. The limitations were that the current review did not comprehensively retrieve various CAM usage among older adults. The present review analysed only two types of supplements extracted through the included studies. Third, a small number of studies were included in this review, thus, limiting other micronutrient supplements that older adults could have consumed.

4.2. Implications for Research and Practice. Various initiatives must be undertaken to provide accessibility and to create awareness and promotion at the primary healthcare level acknowledging the importance of vitamin and mineral supplements for older adults during COVID-19. To improve the overall health of older adults, healthcare professionals should emphasise the benefits and appropriate use of supplementation. Furthermore, there is a need for well-designed trials to evaluate the efficacy of interventions utilising vitamin and mineral supplements under complementary and alternative medicine for COVID-19.

5. Conclusion

Vitamin D and zinc supplementation seem to be adjunctive and may be used in therapy among older adults in preventing and treating COVID-19. However, there are partially mixed reviews of the benefits of the treatment, which mainly focus on vitamin D and zinc supplementation among older adults in the mortality and severity of COVID-19 outcomes. Future studies must include more data on micronutrients and other complementary and alternative medicine usage among older adults during COVID-19.

Data Availability

The data that support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

CMC and SS conceptualised the study, developed the software, and the methodology. CMC, AA(a), SS, AL, and PT curated the data and wrote the orginal draft. CMC and AA(a) performed the visualization and investigated the study. BKC and AQB supervised the study. SS, AA(a), and AA(b) developed the software and validated the study. CMC, SS, AA(b), PT, BKC, and AQB reviewed and edited the manuscript.

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Supplementary Materials

Supplementary material 1: search strategy. Supplementary Figure 1: risk of bias randomised controlled trial (Rob 2.0). Supplementary Figure 2: risk of bias (Robin 1). (*Supplementary Materials*)

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