Table S1. Recent clinical studies evaluating the effect of vitamin D supplementation in patients with immune-mediated rheumatic diseases.

Author, year	Study design, follow-up period	Patients, N	Treatment	Outcome	Result
Chandrashekara et al. 2017[1]	Open label, 3 months	Rheumatoid arthritis, N=73; 25(OH)D3 <20 ng/mL at baseline + DAS28-CRP >2.6	60,000 IU/week for 6 weeks then 60,000 IU/month for 3 months	Improvement in DAS28-CRP, vitamin D status	Decrease in DAS28-CRP and increase in vitamin D >20 ng/mL in the treatment group
Buondonno et al. 2017[2]	Double-blind randomised controlled trial, 3 months	Rheumatoid arthritis, N=39	Methotrexate + glucocorticoid vs. methotrexate + glucocorticoid + 300,000 IU (one dose)	Cell phenotypes, osteoclast precursors, inflammatory cytokines, clinical parameters at 3/12 months	Reduced IL-23 and increased global health score in vitamin D supplemented group
Guan et al. 2020 [3]	Meta-analysis of 6 randomized controlled trials, 12-24 weeks	Rheumatoid arthritis, N=438	8000–50,000 IU/week of oral vitamin D or equivalent or oral 1,25(OH)2D	Disease activity measures	Vitamin D supplementation resulted in a significant improvement in the DAS28 (weighted mean difference (WMD) = -0.41, 95% CI (-0.59, -0.23), P < 0.001), ESR (WMD = -3.40, 95% CI (-6.62, -0.18), P = 0.04) and TJC (WMD = -1.44, 95% CI (-2.74, -0.14), P = 0.03) but not in pain VAS.
Nguyen et al. 2020 [4]	A subgroup meta-analysis of 2 randomized controlled trial, 3 weeks to 1 year	Rheumatoid arthritis, N=252	Oral 50,000 IUs/week of vitamin D3 or 0.5 µg/day of alfacalcidol [1-hydroxyvitamin D3]	Risk of flare in patients in remission	Vitamin D supplementation resulted in an insignificant reduction in flares.
Zheng et al. 2019[5]	A meta-analysis of 5 randomized controlled trials, 3 to 12 months	Systemic Lupus Erythematosus, N=490	200–50,000 IUs/week of vitamin D3 or equivalent	Disease activity measures	Vitamin D3 supplementation resulted in a decrease in the fatigue severity scale scores in patients with SLE in a meta-analysis of 2 trials (n=79; SMD: -1.179, 95% CI: -1.90 to -0.46).

*in treated arm. CI = confidence interval; CRP =C-reactive protein; DAS28: disease activity score in 28 joints; ESR = erythrocyte sedimentation rate; HR = hazard ratio; ICU = intensive care unit; IU = international units; OR = odds ratio; RR = relative risk; TJC = tender joint count; WMD; weighted mean difference; WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index

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Table S2. Recent clinical studies evaluating the effect of vitamin D supplementation in patients hospitalized for COVID-19.

Author, year	Study design, follow up length	Patients, N, age*	Treatment	Outcome	Result
Murai et al. 2020[1]	A multicentre, double-blind, randomized controlled trial	COVID-19, N=240 (16 treated), aged 50 years	200,000 IU "vitamin D3" for 7 days		Length of hospital stay, mortality rate, admission to ICU and mechanical ventilation requirement did not differ between groups. Vitamin D significantly increased 25(OH)D levels
Rastogi et al. 2020[2]	Randomised, placebo-controlled, 21 days	COVID-19, N=40 (16 treated), aged 50 years	80,000 IU cholecalciferol for 7 days	Proportion of patients with SARS CoV-2 RNA negative before day-21 and change in inflammatory markers	10/16 (62.5%) of treated patients achieved SARS-CoV-2 negativity vs 5/24 (20.8%) participants (p=0.018) in the control arm
Castillo et al. 2020[3]	Parallel pilot randomized open label, double-masked clinical trial, FU until admission to ICU, hospital discharge or death.	COVID-19, N=76 (50 treated), 53 years	Calcifediol, 0.53 mg and 0.266 mg at day 3 and 7	ICU, hospital discharge or death.	50 treated; 1 admitted to ICU vs 26 untreated and 13 admitted to ICU; univariate risk benefit: OR 0.02 (95% CI: 0.002- 0.17), multivariate: OR 0.03 (95% CI: 0.003-0.25)
Annweiler et al. 2020[4]	Prospective quasi-experimental, 36±17 days	COVID-19, N=66 (N=57 treated) aged 87.7 years	80,000 IU cholecalciferol	Mortality, and 9-point World Health Organization's ordinal scale	82.5 % in vitamin D group survived vs 44.4 % in comparator group (P=0.023). Mortality reduction: HR = 0.11 [95 % CI: 0.03-0.48], P=0.003. Vitamin D neg correlated with OSCI score for COVID-19 (β= -3.84 [95 % CI: -6.07; -1.62], P=0.001).
Annweiler et al. 2020[5]	Prospective quasi-experimental, 14 days	COVID-19, N=77 (N=16 in pz supp cholecalciferol after diagnosis) aged 85 years	80,000 IU cholecalciferol	14-day mortality, and 9-point World Health Organization's ordinal scale	No benefit from treatment after diagnosis but benefit from previous regular supplementation (N=29) (HR: 0.07, p = 0.017) vs. no treatment (N=32)
Tan et al. 2020[6]	Cohort observational study. All patients were followed through either to hospital discharge or day 30 from onset of symptoms, whichever was earlier	COVID-19, N=43 (17 treated), aged 58.4 years	Single daily oral 1,000-IU dose of vitamin D3 (cholecalciferol), 150 mg of magnesium oxide, and 500 μg vitamin B12 for ≤14 days.	Oxygen therapy, ICU over	DMB exposure was associated with odds ratios of 0.13 (95% CI, 0.03–0.59) and 0.20 (95% CI, 0.04–0.93) for oxygen therapy, intensive care support, or both
Ohaegbulam et al. 2020[7]	Case Series	COVID-19, N=4, 56.3 years	1000 IU cholecalciferol daily (standard dose) or ergocalciferol 50,000 IU daily for 5 days (high dose)	Patients that received a high dose of vitamin D supplementation achieved normalization of vitamin D levels and improved clinical recovery evidenced by shorter lengths of stay, lower oxygen requirements, and a reduction in inflammatory marker status	
Cereda et al. 2020[8]	Prospective observational study	COVID-19, N=324, 38 (11%) treated	Vitamin D supplementation; 58,846 IU/month	hospitalization or mortality	Vitamin D not associated with either hospitalization or inhospital mortality, although a trend toward a 2-fold higher risk of death was associated with vitamin D
Cangiano et al. 2020[9]	Observational study, 2 months	COVID-19, N=157, 63% of subjects tested positive for SARS-CoV-2 on the nasopharyngeal swab test. 37%	Previous vitamin D supplementation	A range of risk factors and clinical characteristics were correlated with outcome	Mortality was inversely associated with vitamin D supplementation

		remained negative			
Ling et al. 2021[10]	A cross-sectional multi-centre observational study, 7 weeks	COVID-19, N=986 (151 treated), aged 74 years	High dose booster therapy: approximately ≥ 280,000 IU in a time period of up to 7 weeks	Mortality	Treatment with cholecalciferol booster therapy reduced mortality OR: 0.38 (0.17–0.84) p=0.018
Giannini et al. 2021[11]	Retrospective analysis, 14 days	COVID-19, N=91 (36 treated), aged 74 years	200,000 IU (×2) cholecalciferol	Transfer to ICU/death	80% reduction in outcome by vitamin D (patients ≥3 comorbid diseases (OR=0.18; 95% CI: 0.04–0.83)
Gönen et al. 2021[12]	Retrospective analysis and prospective study, 14 days	COVID-19, N=867; 163 treated	224-500,000 IU Cholecalciferol/14 days	COVID-19 cases (no comorbidities, no vitamin D treatment, 25(OH)D <30 ng/mL) had 1.9-fold increased risk of having hospitalization greater than 8 days vs. patients with with comorbidities and vitamin D treatment. Vitamin D treatment decreased the mortality rate 2.14-fold.	

*in treated arm. CI = confidence interval; HR = hazard ratio; ICU = intensive care unit; IU = international units; OSCI; Ordinal Scale for Clinical Improvement; OR = odds ratio; RR = relative risk.

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