



### Coronavirus disease (Covid-19) among patients with Multiple Sclerosis: A systematic review of current evidence

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**Background:** We systematically reviewed the literature on coronavirus disease (COVID-19) in multiple sclerosis patients.

**Methods:** We searched PubMed, Scopus, EMBASE, CINAHL, Web of Science, Google Scholar, and WHO database from December 01, 2019, to December 18, 2020. Three conference abstract databases were also searched. We included any types of studies that reported characteristics of MS patients with COVID-19.

**Results:** From an initial 2679 publications and 3138 conference abstracts, 87 studies (67 published articles and 20 abstracts) consisting of 4310 suspected/confirmed COVID-19 patient with MS met inclusion criteria. The female/male ratio was 2.53:1, the mean (SD) age was 44.91 (4.31) years, the mean disease duration was 12.46 (2.27), the mean EDSS was 2.54 (0.81), relapsing/progressive ratio was 4.75:1, and 32.9% of patients had at least one comorbidity. The most common symptoms were fever (68.8%), followed by cough (63.9%), fatigue/asthenia (51.2%), and shortness of breath (39.5%). In total, 837 of 4043 MS patients with suspected/confirmed COVID-19 (20.7%) required hospitalization and 130 of 4310 (3.0%) died of COVID-19. Among suspected/confirmed patients, the highest hospitalization and mortality rates were in patients with no DMTs (42.9% and 8.4%), followed by B-cell depleting agents (29.2% and 2.5%).

**Conclusion:** Our study suggested that MS didn't significantly increase the mortality rate from COVID-19. These data should be interpreted with caution as MS patients are more likely female and younger compared to the general population where age and male sex seems to be risk factors for worse disease outcome.