COVID-19 prevalence and all-cause mortality among musculoskeletal inpatients in Nairobi, Kenya in comparison with non-musculoskeletal patients

Sirs,

Since the confirmation of its first case, COVID-19 has had a considerable impact on the Kenyan health system (1). Previous comorbidities, such as inflammatory musculoskeletal disorders (MSDs), and older age have been associated with a poor prognosis of COVID-19 (2). The susceptibility of MSD patients to COVID-19 appears to be increased (3). This, however, is complex to conclude, as MSD patients with a wide diagnostic variety usually are characterised by many other factors that may affect their susceptibility.

In this cross-sectional study, we investigated the association of MSDs with the COVID-19 prevalence and all-cause mortality. We compared MSD patients (n=1029) to patients with other diagnoses (n=3345) and adjusted the comparison for the most typical factors that universally affect the risk of COVID-19 and death. Up to date cross-sectional data were gathered from one of the most frequented public hospitals in Nairobi metropolitan area, Kenya, between January 1 and September 30, 2022. The medical records provided information regarding patient characteristics, the date of hospital admission, and the reason for the hospitalisation. COVID-19 vaccination status together with the result of the COVID-19 test performed at the hospital admission or before that but after March 13, 2022 was also included. COVID-19 was not considered as the primary reason for patients' admission, but it was used as outcome variable in the present cross-sectional analysis. The study was ethically approved by the Kenyan Ministry of Health Research Ethics Committee (County Government of Nairobi) on August 22, 2022 (MOH/P/78/OOK8191). Patient characteristics and the cross-sectional association of MSD with COVID-19 and mortality are summarised in Table I.

The proportion of COVID-19 positives in the MSD patients was more than double that in the non-MSD patients (15 *vs*. 7%, $p<0.001$). MSD was the main predictor of COVID-19 in the logistic regression model (Table I). After adjusting for alcohol drinking, tobacco smoking, COVID-19 vaccination status, weight, age, and sex the odds of COVID-19 in the MSD patients were 2.3 times the odds in the non-MSD patients. Female sex in general increased the odds of COVID-19, although in the MSD males, the odds of COVID-19 were up to 3.9 times those in the non-MSD males. The MSD and COVID-19 statuses did not predict the odds of death (Table I).

Table I. Patient characteristics and cross-sectional associations of MSD with COVID-19 and mortality.

Patient characteristics	Total	No MSD	MSD	*p*-value
n.	4374	3345	1029	NA
Age in years (mean, SD)	62.0 (9.9)	61.6 (10.2)	63.2 (9.0)	<0.001
Age group (n, %)				<0.001
40 – 49 years	662 (15.1)	543 (16.2)	119 (11.6)	
50–59 years	998 (22.8)	829 (24.8)	169 (16.4)	
60–69 years	1683 (38.5)	1187 (35.5)	496 (48.2)	
70–81 years	1031 (23.6)	786 (23.5)	245 (23.8)	
Female (n, %)	2017 (46.1)	1509 (45.1)	508 (49.4)	0.017
Weight in kg (mean, SD)	69.9 (9.7)	69.2 (10.1)	72.3 (7.5)	<0.001
Female weight in kg (mean, SD)	70.0 (9.6)	69.2 (10.2)	72.4 (7.5)	<0.001
Male weight in kg (mean, SD)	69.8 (9.8)	69.1 (10.2)	72.2 (7.5)	<0.001
Alcohol drinking				<0.001
Never-drinkers (n, %)	3922 (89.7)	3070 (91.8)	852 (82.8)	
Previous drinkers (n, %)	252 (5.8)	136 (4.1)	116 (11.3)	
Current drinkers (n, %)	200 (4.6)	139 (4.2)	61 (5.9)	
Tobacco smoking				0.079
Never-smokers (n, %)	3892 (89.0)	2992 (89.4)	900 (87.5)	
Previous smokers (n, %)	161 (3.7)	124 (3.7)	37 (3.6)	
Current smokers (n, %)	321 (7.3)	229 (6.8)	92 (8.9)	
COVID-19 vaccination				0.004
Not vaccinated	3629 (83.0)	2790 (83.4)	839 (81.5)	
Partially vaccinated	435 (9.9)	306 (9.1)	129 (12.5)	
Fully vaccinated	301 (6.9)	240 (7.2)	61 (5.9)	
missing info (n, %)	9 (0.2)	9 (0.3)	0 (0.0)	
COVID-19 positive (n, %)	390 (8.9)	236 (7.1)	154 (15.0)	<0.001
Died during hospitalisation (n, %)	147 (3.4)	115 (3.4)	32 (3.1)	0.610
Logistic regression for COVID-19	OR	95% CI	*p*-value	HL *p*
Any MSD *vs*. no MSD*	2.34	1.88–2.91	<0.001	0.003
Female *vs*. male	1.32	1.07–1.63	0.010	
Any MSD *vs*. no MSD†	2.31	1.85–2.89	<0.001	0.011
Female vs. male	1.31	1.06–1.62	0.011	
Logistic regression for death	OR	95% CI	*p*-value	HL *p*
Any MSD *vs*. no MSD*	0.88	0.59–1.31	0.542	0.121
Age per one year increase	1.02	1.00–1.03	0.068	
Any MSD *vs*. no MSD†	0.97	0.64–1.46	0.874	0.681
Age per one year increase	1.01	1.00–1.03	0.116	
Subgroup analysis for COVID-19	OR	95% CI	*p* for interaction	
Age ≤60 years (9.5% COVID-19)	1.88	1.29–2.73	MSD by age 0.151	
Age >60 years (8.6%)	2.63	1.97–3.50		
Female sex (10.3% COVID-19)	1.43	1.04–1.97	MSD by sex <0.001	
Male sex (7.8%)	3.86	2.80–5.31		
Non-drinker (8.7% COVID-19)	2.13	1.68–2.71	MSD by drinking 0.072	
Previous or current drinker (10.7%)	4.26	2.16–8.39		
Non-smoker (8.7% COVID-19)	2.30	1.81–2.92	MSD by smoking 0.787	
Previous or current smoker (11.1%)	2.37	1.26–4.45		
Not vaccinated (8.8% COVID-19)	2.29	1.79–2.93	MSD by vaccination 0.732	
Partially or fully vaccinated (9.5%)	2.50	1.48–4.23		
Subgroup analysis for death	OR	95% CI	*p* for interaction	
Age ≤60 years (2.5% mortality)	2.30	1.17–4.53	MSD by age 0.004	
Age >60 years (3.9%)	0.62	0.37–1.04		
Female sex (3.5% mortality)	1.29	0.75–2.21	MSD by sex 0.062	
Male sex (3.3%)	0.67	0.35–1.30		
Non-drinker (3.5% mortality)	1.02	0.67–1.56	MSD by drinking 0.477	
Previous or current drinker (2.4%)	0.65	0.16–2.67		
Non-smoker (3.4% mortality)	1.02	0.67–1.56	MSD by smoking 0.329	
Previous or current smoker (2.9%)	0.55	0.12–2.64		
Not vaccinated (3.2% mortality)	1.08	0.69–1.69	MSD by vaccination 0.300	
Partially or fully vaccinated (4.1%)	0.64	0.23–1.74		
COVID-19 negative (3.5% mortality)	0.91	0.59–1.39	MSD by COVID-19 0.288	
COVID-19 positive (1.8%)	3.20	0.66–15.45		

CI: confidence interval; HL: Hosmer and Lemeshow goodness of fit test; MSD: musculoskeletal disorder; OR: odds ratio; SD: standard deviation.

*adjusted for age and sex; †adjusted for age, sex, alcohol drinking status, tobacco smoking status, COVID-19 vaccination status, and weight.

Our main findings were consistent with the previous studies. The studies report that MSDs are associated with an increased risk of COVID-19 (4-6). In our study, however, the prevalence of COVID-19 in MSD patients was twice as high as the prevalence in non-MSD patients. It also was distinctly higher than the prevalence reported in other studies (7). Generally, the increased risk of COVID-19 in MSD patients has been associated to the autoimmune condition as such and to treatments with corticosteroids (3). In the present study, female sex was associated with a higher prevalence of COVID-19, while MSDs increased the risk of COVID-19 specifically amongst males. Female sex has been reported by some studies as a risk factor for long-term post-COVID related symptoms (4), while other studies have not found such an association (8) or largely identified male sex to increase the risk (5, 6). These findings could be partly due to a lower production of pro-inflammatory interleukin-6 (IL-6) after viral infections in females that is associated with a prolonged COVID-19 symptoms (9). On the other hand, a stronger IgG antibodies production in females has been reported especially during the early phase of COVID-19 (10). This may contribute to disease manifestations.

In conclusion, the present results showed that MSDs are associated with the increased COVID-19 prevalence among hospitalised patients in a Kenyan metropolis, especially in males.

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